

QCOM site controller operating procedures

Version 1.6.6.2



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2. Introduction

The Office of Liquor and Gaming Regulation (OLGR) develops communications protocols for use with gaming machines in the State of Queensland.

Purpose

This document defines the operating procedures of a local area licensed gaming venue's "Site Controller" (SC) with respect to Gaming Machines operating on the OLGR QCOM protocol Versions 1.5.5, 1.6.x and also the older I.G.T. protocol. These protocol documents should be read and thoroughly understood first before reading this document.

Applicability

This document is required reading for developers of monitoring systems and Site Controllers for both the QCOM and I.G.T. EGM Protocols. EGM manufacturers do not require a copy of this document to implement the EGM protocol.

Please note that the "default" values for the parameters listed in this document are specific to the QLD jurisdiction for the Clubs and Hotels market and that different parameters will be required for other markets and jurisdictions. However the procedures mandated contained in this document are generally applicable to all monitoring systems regardless of jurisdiction.

3. General

Terms and Abbreviations

Please refer to the QCOM EGM protocol document for the glossary of terms and abbreviations used in this document.

Notes regarding submissions with respect to this document.

Licensees submitting a gaming machine monitoring system for evaluation are required to provide a written response to this document, on a point by point, requirement by requirement basis. One intention for the response is that it is a declaration of compliance; however, it is also intended to be an aid to the test engineer in order to expedite and reduce the cost of the evaluation process.

When drafting the response to these requirements, be aware that the target audience is primarily a systems test engineer knowledgeable in QCOM, EGMs, EGM monitoring and all associated requirements, but may not necessarily be familiar (at least initially) with the operation of the particular Monitoring System under test. Accordingly, it is extremely helpful if in the response to each requirement, if the response also provides a reference into the monitoring system documentation as to where compliance to the requirement can be demonstrated (where this is not obvious). For example, responses to each requirement should take the form:

Requirement: <Section / paragraph / short reference>

Complied / Do not comply:"* > (If 'not' then state reasons as to why)

Refer:

<A reference into the system to where the system complies that demonstrated the compliance.>

For example, the reference could be:

A reference to a system report: E.g., ReportGen Application->Reports->Events->OLGR.

A reference to a user interface: E.g. Host application->Main Menu->Venue->SPAM->Configure

A reference to Monitoring System source-code (in cases where the requirement cannot be easily verified empirically). E.g. Module: / SC / main / communications / mymodule.cpp: Line: 1234

Notes: *<Any other information that could be provided in order to expedite the evaluation. E.g. Tips or pointers on how best configure the system in order to demonstrate / test the requirement (where this is not already intuitive or obvious). (SC event queue full testing is a good example of when additional information would be extremely helpful). References into system documentation are also helpful in this regard.>*

Protocol Versions

OLGR may increase the scope of the EGM protocol at any time. OLGR will attempt to make new enhancements (by adding additional message types, larger messages and new events) such that properly programmed existing EGMs and SCs should automatically ignore any new information until such time as they are programmed to handle it, without any side effects.

It is the SC's responsibility to communicate to the EGM via the correct protocol version. The EGM reports its protocol version in every response via the DLL CNTL field and also in the EGM Configuration Response.

Other Protocols

It is acceptable for the SC to embed other protocols within the OLGR EGM protocol for its own use provided the requirements in this document and the EGM protocol document are adhered to at all times. Please pay close attention to the QCOM & I.G.T. Protocol timing requirements.

Protocols embedded within the OLGR EGM protocol must be submitted and approved by OLGR.

Other

It is a SC's role as a part of the overall EMS, to monitor and collate not only the day-to-day data an EGM produces (meters and events), but the EGM's health as well (including identifying operational issues and bugs with EGMs). Accordingly, it is very important that when implementing the protocols that SCs must not assume any behaviour from an EGM will ever be as the protocol dictates. The SC must also not assume that any data it receives from an EGM is ever correct. Strict integrity and sanity checks must be applied before accepting and processing any received EGM data at all times. For everything that a SC expects or assumes from an EGM via the protocol, the SC **must** have a handler to the contrary and it must record all deviant behaviour as events with details for diagnosis. Flow on side effects in a SC as a result of any errant EGM behaviour is not acceptable.

For any undefined behaviour the SC should always assume the worst case scenario.

It must not be possible either inadvertently, or forcibly, to get a SC into a deadlock state (i.e. requiring a reboot, or RAM clear of any device, including itself, in order to fix).

A SC must be immune to any possible type of malformed message attack on any of its communications ports.

A SC must filter out any garbage on any of its communications ports received at any time and be able to recover the instant the garbage ceases.

Modes of Operation

The EGM protocols can be operated by a SC in either point-to-point or multi-point mode, however in QLD, it is mandatory that the protocols are operated in multi-point mode. Refer to the “EGM Communication Interface & LAN Requirements” document for more information.

SCs must be able to support all of the QCOM & I.G.T. EGM protocols on the same LAN. SCs must be capable of hot-switching baud rates to achieve this requirement. Mixing protocols of different baud rates on the same network is not recommended as a long-term strategy. This is a temporary measure until the IGT protocol EGMs are completely phased out of the market.

A SC must be able to support a minimum of 32 EGMs each with up to 16 games per EGM* and up to 16 variations per game*.

(*a QCOM v1.6 EGM may indicate a higher number of games or variations before EGM Configuration has been completed via the EGM Configuration Poll. This feature must be supported by all SCs. Refer QCOM Protocol section 9 for more information)

3.1. Off-line SC Operation

A SC may continue normal operations when disconnected from the host computer for as long as; its event and meter logs are not full, it can maintain the minimum percentage return to player (i.e. w.r.t. WAN jackpots) and it can still open and close the site at the correct licensed gaming hours. (However note that section 4.4 prevents EGMs that are RAM-cleared during the off-line period from being brought back into play.)

SCs must have sufficient NV-RAM to ensure that its event log never becomes full during normal operation. Refer section 3.2 for the SC event log full procedure. It is expected a SC must be able to operate for at least 72 hours in off-line mode before running out of memory. It may be assumed that communications is clean, an average number of events per EGM are being generated and there are no EGM event runaways. Some consideration must be given to handling event peaks. It is estimated there will be an average of 5 events per EGM per day with peaks up to 10 events per EGM per day often at the beginning of a month (e.g. due to cash clearances).

Note, LP games will require a SC to have additional NV-RAM and/or host contact due to the significant number of events these games can log during play, especially for rapid LP jackpots.

If a SC in off-line mode detects it has less than 10% NV-RAM remaining, the SC where possible, must automatically disable any nonessential value added services and EGMs on linked jackpots in order to conserve remaining memory.

3.2. SC Event Log Full Procedure

If a SC's event log should ever become full, the SC must disable the EGMs under it via the global broadcast message and stop polling all EGMs (broadcast messages must still be sent), until such time as its event log is purged and space becomes available.

To avoid losing any events, SCs must declare themselves full at approximately the 95% full level to allow for some additional events to be stored.

3.3. SC Fault Tolerance and Data Integrity

The SC must implement integrity checks on its internal event queue/s equivalent to or better than the integrity check requirements placed on an EGM's event queue as specified in the QCOM Protocol document.

Meters data stored in the SC must have at a minimum, either CRC protection, or multiple (inverted) copies.

The SC must also have a general error detection methodology operating on all other data stored in its NV-RAM. If the data is not CRC protected or is not being verified against multiple inverted copies, then at a minimum the SC must use RAM validity codes*.

(*RAM validity codes refer to a simple technique where bytes of a particular fixed arbitrary value (usually 0x55 or 0xAA) are scattered throughout NV-RAM (especially around important data). At certain times (at the discretion of the SC), the validity codes are verified. A NV-RAM corruption is indicated if any of the codes have changed.)

SC NV-RAM integrity must be verified at least upon every power up or restart of the SC software and periodically, at least once every hour.

Upon a SC non-recoverable RAM Error:

- The SC must disable.
- The SC must cease all communications to individual EGMs.
- Time Broadcasts and GPMs may still be sent, but no other extended broadcast types must be sent.
- The SC must indicate the error condition on its display, or indicator lights.
- Host communications may continue for diagnostic purposes only. The SC must not send meters or event data to the host if in a RAM error, unless those meters or events that can be individually verified as still being okay via their own embedded CRC or equivalent.

3.4. Timekeeping

The current date and time must be maintained centrally in the monitoring system host computer which must ensure all SC's current date and time is kept accurate throughout the network.

Upon connection to the host system and periodically (at least once per day) the SC must verify its current RTC time with the host system's date and time and updating its RTC if required. The SC must also log an event if the time difference was greater than 5 seconds.

Warning! If the SC is using its RTC for timing routines or time stamped variables, then changing its time upon command from central could cause timers or time variables to become invalid. This may result in serious problems if the timers or variables were subsequently used in calculations or validations. Changing the time can also cause problems for some older C library functions, e.g. clock(). It is recommended a SC does not use time in any internal calculations except where

absolutely necessary and then it must take into account possible time adjustments. This problem will not affect time stamps which are simply used for audit trails and event logs, so long as they are not used in any calculations.

Any timing routines used by SC software must be verified to either operate independently of the RTC or be unaffected by changes to the RTC current time by the host computer.

Developers should check all use of time in their SC software for possible adverse side effects as a result of changing the time (e.g. daylight savings). E.g. poll cycle timer, EGM program hash time-out timer, 'LP Award' event processing (there will be issues here if time goes backward¹), EGM time stamp checking, venue operating hours, and possibly others not listed here. Any LP Award Events still in the EGM/SC event queues should be sent to the host and purged as a priority to avoid any issues if for example a Request All Logged Events poll (4.7.12) occurs after a time change.

Timekeeping is especially important for QCOM Linked Progressive support. Failure of the SC to properly compensate for a time change may result in valid new LP Award events being ignored.

3.4.1. SC NV-RTC Sanity Check on Power Up

This sanity check is only mandatory for site controllers that utilise separate physical backup batteries on its NV-RTC and NV-RAM.

During operation, the SC must store a copy of the current date and time in NV-RAM, refreshed once per second.

Early on in the SC application's power up sequence, the SC must compare the current date-time stored in the NV-RTC against the date-time value stored in the SC's NV-RAM. Any negative time movement (other than a scheduled or expected daylight savings change), or an unreasonable jump forward in time against a host stored threshold (suggest 60 days) and the SC must log an event (4.14.2.23), suspend the power-up sequence and remain disabled until its time is refreshed by the host system. Also refer section 4.14.2.21.

3.5. EGM Processor Door Access

Upon detection of any new* processor door accessed event from an EGM, the SC must disable the EGM concerned until the access has been acknowledged by an authorised person. The authorised person must be in the employ of the LMO.

*As EGM processor door open/close/power off access events must now be monitored; SCs must take into account the fact that sometimes events are seen more than once (e.g. after a Request All Logged Events Poll 4.7.12) and each event should only be acted upon once.

¹ For example; failure to account for a negative SC time adjustment may result in the last LP award hit time used to validate new LP award events which will cause the LP award aged test to inadvertently fail resulting in new LP award events to be incorrectly ignored. Also existing LP award events in an EGM's event queue, if resent, may incorrectly retrigger jackpot resets.

3.6. QCOM Fibre Optic LAN Diagnostic Functions

This section is applicable to Site Controllers operating QCOM over fibre optic loops installed according to the OLGR LAN and Interface Specifications Requirements document. (Except for the communications logger, some items in this section may not be mandatory for legacy systems. Check with the OLGR.)

Where a SC is using additional protocols to QCOM on the same LAN and at different baud rates, for diagnostic purposes, it **must** be possible on demand to temporarily turn off specific protocols leaving just the protocol/s at the same baud rate on the loop. This is because it is significantly more difficult to diagnose problems with a fibre optic loop when there are protocols running on a loop at different baud rates.

The following information must be able to be displayed for each loop in real time in the Monitoring System (preferably on the SC's display if present and remotely over the WAN):

- **Responded:** Number of EGMs that responded to the SC on the last QCOM poll cycle with a valid CRC (wrt the total number of EGMs on the loop). E.g. "Loop 1: Responded: 11 of 12"
- **Loop Downs (Meter).** Incremented each time a new loop down is detected (refer 'SC QCOM Loop Down' event for a definition, the SC must increment the meter each time a new loop down is detected)
- A **loop down** indicator.
- A **Poll Cycles** count (Meter).
- **Broadcast Echo Fails (Meter).** A count of the number of broadcast messages which failed to echo back to the site controller, but excluding those that occur during a "loop down" condition or lead into one. (refer 'SC QCOM Loop Down' event for a definition of "loop down")
- **Missed Responses (Meter).** A count of the number of missed responses, which is incremented **only** when an EGM misses either one, or two consecutive responses in a row then resumes responding for at least one poll. Must be tallied on a per loop basis at a minimum. However on a per EGM basis is also very useful for individual EGM performance monitoring.
- **CRC Errors (Meter).** A count of EGM response CRC errors. Must be tallied on a per loop basis at a minimum, however on a per EGM basis is also very useful.
- **Broadcast NAKs (Meter).** A count of all received broadcast NAKS. These are only receivable from QCOM v1.6.x EGMs; refer QCOM Protocol document section 14.3.1. Must be tallied on a per loop basis at a minimum. However on a per EGM basis is also very useful.
- **Garbage (Meter)** A count of all garbage received during the Poll Wait function, refer section 4.5.8. Must be tallied on a per loop basis.

Any above data which is classified as a "(Meter)", must also be auto-saved to the host and auto-reset on a daily basis. The saved data must be able to be reported for the purpose of ongoing loop health monitoring. This saved data may be auto-purged by the monitoring system after a minimum of **3** months.

SCs must also contain the following diagnostic functions:

- A Fibre Optic loop-back test function.

This function when activated sends out bursts of data (e.g. 512 bytes in a specific sequence repeated for ~ five seconds) at an arbitrary entered baud rate (up to 115200baud – make this the default) and reports back how much (%) of the data was correctly echoed back. (Rationale: Borderline or weak Fibre Optic loops will tend to have trouble at the higher baud rates). Accordingly it is recommended that loops be tested up to 115200 baud upon installation or any maintenance, which will ensure perfect operation at the actual QCOM baud rate of 19.2k baud.

This function must be able to be activated on demand and automatically once per day. The results of each test run must be logged and viewable in the monitoring system.

- A low level communications logger (Mandatory)

A feature in the SC must exist that when activated, causes the SC to start logging the raw QCOM communications hex data to a text file for a given loop. On demand, the SC must be able to send the current log file on to the host computer for analysis. Within the log file, new messages (i.e. bytes with parity bit set) must start on a new line (this is the reason it must be a text file). It is acceptable if the log contains additional decoded information in addition to the hex data (refer QSIM – communications debug display for decoding examples). The log file must be able to store a minimum of up to one hour's worth of QCOM traffic². Old data must automatically be purged from the log file to avoid filling up SC memory/drive space and to allow the logger to be left on indefinitely if required. Once logging is activated, deactivation must be able to be linked to an arbitrary event code, or event code / EGM combination in the SC being logged, as well as being able to be manually deactivated.

3.7. Hourly Turnover Meters

(This section in some cases may not be mandatory for legacy systems. Check with the OLGR.) A Site Controller must log every hour, Utilisation and Turnover meters for all EGMs under it (see below). The following information must be sent and stored in the host at least once a day.

Date, SC_UID, VenueID, nEGMs, nEGMe, Utilisation₀, ..., Utilisation₂₃, Turnover₀, ..., Turnover₂₃

Where:

VenueID = OLGR assigned site number

SC_ID = Site Controller unique ID number.

nEGMs = No. of EGMs at the venue at the venue at day start.

nEGMe = No. of EGMs at the venue at the venue at day end.

Utilisation_n = % of EGMs at the venue that were "in-use" for the hour for the venue. (An EGM must be considered "in-use" for any 15 second period in the hour if it had had any meter movement or had been in any of the three "play in progress" QCOM 'General Status Response' state codes. I.e. 240 samples per hour per EGM)

Turnover_n = total turnover for the hour for all EGMs for the Site Controller.

Meters must be periodic, i.e. for each hour rather than cumulative throughout the day.

² Preferably a several days worth.

This information must be able to be exported from the system's database on demand in a text format. In the future it will become a component of the OLGR 'Data Requirements'

4. QCOM PROTOCOL OPERATING PROCEDURES

4.1. QCOM Version v1.6

The procedures in this chapter cover both QCOM protocol versions; namely v1.5.x and v1.6.x. Where different procedures apply between the two protocol versions, then this will be clarified. Search for the text 'v1.5' & 'v1.6' in order to quickly skip through the main differences between the two versions of QCOM.

Section 4.13.1 explains how a SC can immediately distinguish between a QCOM v1.5 EGM and a QCOM v1.6 EGM on any response.

4.1.1. Backward Compatibility Issues

In going from QCOM v1.5 to v1.6, no QCOM v1.5 fields have been redefined or deleted. This means that a SC may send QCOM v1.6 formatted polls to a QCOM v1.5 EGM (so long as any superseded v1.5 fields are still populated as per QCOM v1.5). Existing QCOM v1.5 EGMs will automatically ignore any additional data contained in any poll it receives that it is not already programmed to process. This extendable feature of QCOM has been thoroughly tested in all QCOM v1.5 EGM software.

However, it is not possible to send a QCOM v1.5 formatted message to a QCOM v1.6 EGM, a QCOM v1.6 EGM would see this as a corrupt message.

4.1.2. Optional Sections of QCOM v1.6

The following sections of QCOM v1.6 do not have to be implemented by QLD SCs at this time:

- Section 19 'EGM to EGM Communications'
- Section 20 'QCOM Command Prompt'
- Section 21 'Finding EGMs...'
- Section 22 'TITO'

4.2. SC RAM Reset Recovery Procedure

1. The SC may not commence polling the EGMs or send global messages until after it has been completely initialised by the monitoring system with the current date and time, valid EGMs/games and all other configuration data.
2. Once a SC is completely configured, it may then start polling the EGMs.
3. The SC must then queue a 'Request All Logged Events' poll for all EGMs and follow the 'SC Power up and EGM Resumed Responding Procedure' below.

4.3. SC Power up and EGM Resumed Responding Procedure

1. If any EGMs under a SC are not responding the SC must periodically broadcast the EGM's serial number and poll address via the broadcast message until the EGM resumes responding on its assigned poll address.
2. Once an EGM resumes responding, the SC must request EGM Configuration, possibly the EGM Program Hash (refer 4.7.8), EGM Game Configuration & Progressive Configuration (for the currently enabled games in the EGM) and CRanE Configuration and verify the results as correct.
3. If any result from above is found to be incorrect or times-out, the SC must leave the EGM disabled, log the appropriate events and suspend this procedure until ordered to try again by either the host system computer or if the EGM stops/resumes responding.
4. If the subsequent reported configuration and program hash (if requested) are correct, the SC must poll for all defined EGM group meters, multi-game/variation, Bet Meters, Player Choice Meters and SAP meters (if applicable) for the current game and variation in play.
5. The SC must then wait for 2 consecutive General Status Responses to ensure all data is received. Once this is completed, the SC may enable the EGM via the EGM Machine Enable Flag.

For linked progressive EGMs the SC must also ensure before enabling the EGM that the EGM has received the latest current progressive amounts.

4.4. EGM RAM Reset Initialisation Procedure

The recommended way to detect if an EGM has been RAM cleared is by receipt of an EGM Configuration response from an EGM with the denomination & token fields equal to zero. This indicates the EGM requires initialisation.

1. Upon detection of an EGM requiring configuration following a RAM clear, the SC must immediately save all last known meters for the EGM (i.e. create a meter log event/record in the SC containing all last known meters to be sent to the host computer) and reset next expected meter values to zero to avoid inadvertently reporting unreasonable meter increments.
2. The SC must then send as necessary, the EGM Configuration*, EGM Game Configuration and Progressive Configuration polls for the EGM to complete initialisation and follow the EGM resumed responding procedure as described in the previous section.

(*NB. EGM configuration must be successfully completed by the SC before any game configuration takes place.)

3. The SC must not enable an EGM after an EGM RAM clear until the last known meters and events for the EGM stored in the SC have been sent and stored in the host system computer. This is to minimise the possibility of losing critical data, by ensuring that the possible time period in which meters and events for an EGM are stored in only one physical location in a gaming venue is limited.

If an EGM or any game configuration is rejected by the EGM, for whatever reason, it must not be necessary to RAM clear the EGM again in order for the EMS to recover from this situation.

4.5. Poll Cycle

A "Poll Cycle" is defined as the process of the SC sending a single poll to each EGM's address followed by a global broadcast message poll. This is inclusive of required response wait periods (4.5.3 & 4.5.4) and poll cycle pauses (4.5.5). Refer QCOM Section 14 for more information.

4.5.1. Frequency

A new poll cycle must commence **once per second** provided the previous poll cycle has been completed. If the previous poll cycle took longer than a second then the next poll cycle will start as soon as the previous poll cycle is finished.

For example, the poll cycle may be temporarily slower than one second in times of heavy traffic (e.g. after a communications failure and the SC is reinitialising, or if the number of EGMs on the LAN forces the poll cycle over one second). Note the term "traffic" above refers only to OLGR protocol communication traffic; it is not acceptable for non-QCOM traffic to consistently slow down the QCOM poll cycle to be greater than one second.

QCOM gaming machines are tested to operate with poll cycles as low as **250msec**. Accordingly it is acceptable for a SC to run a poll cycle down to this rate. However there are increased risks in doing this on QCOM multi-point loop LANs. Specifically, because a QCOM v1.6 machine will disable and reset its communications state on 3 successive NAKs, meaning that at a 250msec poll cycle rate, it only takes a burst of 750msec* of garbage to temporarily disable a QCOM v1.6 EGM (as opposed to 3 seconds at the nominal poll cycle rate of one second).

**It should be noted that OLGR has observed some EGM/s & FOI cards disrupt a QCOM multi-point loop LAN for approximately this period when they are powered up. OLGR will not approve equipment that is observed to do this under test. However in some cases these issues don't show up in all machines tested and therefore may be present in some production machines.*

4.5.2. Parsing over Poll Echoes & Finding Responses

Typically QCOM is operated over communication loops. This means that the SC will "see" anything it transmits back again.

As a result, a SC must be able to reliably and accurately parse over its transmitted (poll) data in order to find the first byte of any response from an EGM and subsequent response message.

A SC must never under any circumstances, be able to confuse its own poll data as an EGM response or part thereof.

A SC must filter out any garbage on any of its communications ports received at any time and be able to recover on the next message the instant the garbage ceases.

The best method in which a SC would use in order to parse over echoed data will vary due to SC Operating System software and hardware features and constraints. Accordingly no specific method will be mandated.

4.5.3. Response Timeout.

The SC must poll an EGM and wait at least 6 milliseconds for an EGM response to be initiated before declaring a non-response and moving on.

Note a response may be initiated by the EGM 0-5 milliseconds after the last received message poll byte. *(NB Many recent model EGMs average response time is approximately 0.01 milliseconds; older models EGMs range from 2.5 -5 milliseconds)*

4.5.4. Inter-character Time Out.

During a response the SC must wait 3 milliseconds for each successive character. If an inter-character time-out occurs the SC must declare a non-response. (The use of FIFOs in SC UARTs is encouraged and the stated timing above may be adjusted upwards accordingly.)

4.5.5. Pause at end of Broadcasts.

To ensure the EGMs have enough time to process global messages, the SC must pause for a minimum of 5 milliseconds after the last transmitted character in a broadcast message before transmitting any further data.

4.5.6. Out of Hours.

During non-gaming hours when the site is disabled via the SEF, it is acceptable at the monitoring system's discretion, to only poll each EGM every 2nd poll cycle. Note, broadcast messages must still be sent every poll cycle.

4.5.7. Other Services.

If a poll cycle is less than one second in duration, then the unused channel capacity may be used for other services e.g. Player tracking, jackpot systems, etc. SCs may also use bandwidth up to 10% of the QCOM poll cycle time, per poll cycle, for other service communications. E.g. If the QCOM poll cycle was taking 0.5 seconds, then the SC may take up to 50msec additional time between each QCOM poll cycle for other service communications.

Other service communications must not interfere, degrade or impede basic monitoring in any way.

4.5.8. Poll Wait.

A SC must wait 4 character times worth of no received bytes (if it doesn't already do so by default through message processing delays) before commencing the transmission of any new poll. This is

to ensure any garbage has subsided before sending another message and allows easier debugging of a bad or faulty FO LAN. If any bytes are received during the wait, then the SC must wait another time out period. After a successful 'Poll Wait' it is expected that the SC rx communications buffers are empty.

To avoid the possibility of waiting indefinitely, the maximum time a SC must wait is either 30 milliseconds, or 50 bytes worth of garbage (whichever is easiest to implement in the SC).

Note as a result of the above requirement, it is possible that a SC may have to wait a relatively long period if the LAN loop is being constantly clobbered with data. In this situation the SC must be programmed to ensure that other SC functions (e.g. SC to host communications) do not deadlock as a result of waiting. It is also required that the SC must log an event in the case it has to wait for more than 30 milliseconds or 50 bytes worth of garbage. To avoid the possibility filling up the SC event queue with 'SC Communications Clobbered' events, the SC must not log this event more than once per poll cycle.

4.6. Meter Exclusion Period

The SC must not poll for any EGM meters, ignore any meter responses/contributions and disable the EGM (via the EGM Machine Enable Flag) at the following times:

- After an EGM resumes responding after a non-responsive period or SC power up, until a correct EGM Configuration response is received by the SC.
- After an EGM resumes responding after a non-responsive period greater than 10 seconds, or SC power up, until a correct EGM Program Hash is obtained.

4.7. Poll Messages

This section deals with any requirements and procedures concerning specific poll types.

Reserved fields in poll messages: The SC must always set any reserved fields in poll messages to zero.

Site controllers must set the Data Link Layer CTRL byte bit 0 to the value of 1 in all polls and broadcast messages. This bit is known as the 'lamapoll' flag. It is for possible future expansion concerning the possibility that QCOM may need to be operated over 8-bit networks in the future.

4.7.1. EGM Configuration Request

This poll is sent after every non-responsive EGM period, SC power up and during EGM initialisation after an EGM RAM clear to allow SC verification of the EGMs configuration before enabling the EGM.

Bit 5 (MEF) of the FLG field must always be set to zero in this poll.

Bit 6 of the FLG field is generally never set, Game Configuration Responses are usually requested via the EGM General Maintenance Poll.

Bit 7 PSN reset, must be used as dictated later in this document (Refer 4.13.3.3).

4.7.2. EGM Configuration Poll

This poll is sent by the SC whenever an EGM is detected to require initialisation after an EGM RAM clear. In a QPv1.6 EGM, this poll may also be used to change an EGM's credit denomination on demand (if the EGM supports this feature, see EGM Configuration Response). Support for denomination hot-switching is mandatory for the SC. The SC must use the EGM Configuration Response to verify changes to the EGM's credit denomination.

All acceptable parameter values to be used in this poll are specified by the OLGR.

DEN & TOK may be chosen at the discretion of the LMO so long as the DEN & TOK combination selected has been approved by the OLGR for the particular game. Monitoring systems must support a possible denomination range of 1...\$99.99 (inclusive) at a minimum.

QPv1.6: Values to use for QLD Clubs and Hotels:

MAXDEN	\$1
MINRTP	85.00%
MAXRTP	92.00%
MAXSD	30
MAXLINES	65535
MAXBET	\$5
MAXNPWIN	\$10,000
MAXPWIN	\$25,000
MAXECT	\$10,000

QPv1.6: Parameters in this poll listed above are global. This would imply that the CMS only needs to store only one set of these parameters for the entire state, but must be stored per EGM to cater for possible special cases.

Also, with respect to the verification of the currently set parameters in EGMs, it is likely that if any of the above parameters were changed by the OLGR, that the old parameter/s will still be allowed to be continued to be used by any EGMs currently configured, until such time as each EGM is next RAM cleared, at which time the SC must then automatically configure the EGM with the new parameters. **Therefore the old values of the parameters must still be considered valid by a SC until after the next RAM clear of each EGM.** Accordingly, the host system/SC must maintain a current set of these parameters for every EGM via the EGM Configuration Response.

Denomination Hot-Switching

The conditions in which an EGM will accept a denomination change are listed in the QCOM Protocol document.

Prior to a denomination hot-switch occurring, a text message* must be displayed on the EGM by the SC for at least 1 minute before the switch; then after the switch successfully occurs, the message must be replaced and another displayed until the next play commences.

*SPAM A in the prominent position must be used for this and the message text to be used is listed in section 4.7.20.

The intent of the requirements above is to minimise the possibility of player confusion across a denomination switch. This requirement is not mandatory if the EGM's game/s are changed at the same time as the EGM's denomination is changed.

Contact the OLGR regarding policy concerning the frequency of denomination changes on gaming machines.

4.7.3. EGM Game Configuration Poll

The SC must send this poll once per EGM RAM clear for each game and variation in the EGM that it wants to enable. A SC must only enable games and game variations that have been approved for the particular jurisdiction the machine is in. (Often EGMs have many game variations, some of which may not be suitable)

QPv1.6 EGMs will ignore this poll if: EGM configuration has not been completed; a LP only game is told to be SAP; PNUM is invalid.

The QPv1.6 VAR-lock field is not to be set by QLD SCs.

If there have been no changes to the EGM's configuration after an EGM RAM clear, then the SC must automatically restore the last known SAP current contribution amounts for each game (as received in the last Progressive Meters Response prior the RAM clear) via this poll. The monitoring system must also have the ability to override this feature and restore alternative values as desired by the operator.

If the SC is ever ordered to discard saved SAP current contribution amounts (received via Progressive Meters Responses) for any reason (e.g. decommissioning a SAP EGM), then the SC must log the 'SAP Contribution Discarded' event for each SAP level. Refer to section 4.14.1.23.

If the EGM's shared progressive flag is set then the progressive related items in this poll must be identical in other Game Configuration Polls sent to other progressive games in the EGM.

4.7.4. EGM Game Configuration Change Poll

Pre QCOM v1.6, this was known as the 'EGM Variation Change Poll'.

This poll may be generally used at the operator's discretion to change an EGM's progressive group ID (PGID) or variation (VAR). However, the OLGR has placed restrictions on how frequently and under what conditions an operator may change an EGM game's variation. Refer to the QLD Gaming Machine Act/Regulation for more information. Note also that changing PGIDs may have ramifications for third party jackpot display systems which use PGIDs to display the correct jackpot amounts. The operator should check with the venue before changing PGIDs.

Before the OLGR will allow hot switching of a game's variation, the monitoring system must first be capable of individually tracking all of a game's variations multi-game/variation meters. Note that the SC still only needs to store one set of variation meters per game as only one variation per

game can be enabled at any time. This is true so long as it sends the last known variation meters to the host computer before switching to a new variation in a game.

Note that an EGM will not allow its variation to be changed if it doesn't support hot-switching (refer EGM Configuration Response) or if its credit meter is not zero or a play is in progress. The EGM should also be **disabled** during the switch and also note that an EGM won't perform the change if it was not in idle mode at the time. VAR switches should be avoided while there is a player in attendance (e.g. perform them outside licensed gaming hours). Also ensure the SC polls for the last multi-game/variation meters before instigating the switch.

If a VAR switch must be performed while there may be a player in attendance, the SC must adopt one of the following techniques to change the VAR:

- a. Use a System Lockup to warn the player with a suitable warning message (e.g. "Game configuration changing, refer Player Information Display "press i button"" or other suitable message). The lockup must be displayed for at least 20 seconds and the VAR change instigated immediately after lockup exit.

Summary of the above game variation change procedure (does not include error or interruption handling):

1. Disable EGM via MEF (If not already)
2. Wait for (Credit == 0) && (State == Idle) mode
3. Get Game Meters
4. [Queue System Lockup – see above paragraph]
5. [Wait 20 seconds then clear System Lockup]
6. Change VAR via EGM Game Configuration Change Poll
7. [Confirm change via EGM Game Configuration Response]
8. Re-enable EGM (if within licensed gaming hours and no other issues)

- b. the SC must automatically wait until the EGM has been idle with zero credit (no QCOM detectable player activity whatsoever) for a consecutive period of 3 minutes before changing a games variation.

4.7.5. EGM Parameters Poll

The SC must send this poll once per EGM RAM clear or whenever any of the defined parameters are changed in the monitoring system. The EGM must be kept up to date with the latest EGM parameters at all times.

For QLD Clubs and Hotels these parameters are currently to be set at:

Parameter	Value	Scope in EMS ³
Reserve Feature Flag (QPv1.6)	0	One per EGM
Autoplay Flag (QPv1.6)	0 (SCs must have this value hard-coded in their s/w)	Not Applicable
CRLIMIT Mode Flag	0	One per EGM

³ The reason why the scope of most parameters is set at 'per EGM', is to make the EMS more versatile. For example, if one model EGM has a bug in its reserve feature, then the reserve feature can be disabled in just those EGMs.

OPR	OLGR Assigned LMO ID. If not applicable then set OPR to zero	Global or better is fine
Large Win Lockup Limit (LWIN)	Set at the discretion of the LMO (suggest \$10,000 or \$10,001)	One per EGM
Credit Meter Lockout Limit	\$100.00	One per EGM
Maximum number of double-ups (DUMAX)	5	One per EGM
Double Up (Gamble) Limit (DULIMIT)	\$10,000	One per EGM
TZADJ (QPv1.6)	0*	Don't Care
PWRTIME (QPv1.6)	Make 15 minutes the system default but may be changed at the gaming venues discretion	At least one per Venue
PID (QPv1.6)	0x01	One per EGM
EODT (QPv1.6)	Venues discretion	At least one per Venue
NPWINP (QPv1.6)	\$10,000	One per EGM
SAPWINP (QPv1.6)	\$10,000	One per EGM

*The SC/EMS may use TZADJ at its discretion. The TZADJ field may be optionally used by monitoring systems running across more than one time zone and for daylight savings support.

4.7.6. External Jackpot Information Poll (EXTJIP)

(Added in QPv1.6) The monitoring system/SC must **automatically** keep applicable EGMs up to date via this poll with details of any external jackpot systems they are placed in. This is only mandatory for new external jackpot systems running on QPv1.6 EGMs.

The SC must set the 'Display Flag' = 1 (The SC must also broadcast external jackpot current amounts to the EGMs placed in external jackpots. The broadcast frequency for external jackpots via the LP Broadcast, is the same as per QCOM LP jackpots)

LNAME must not be blank for a given level and must be unique with respect to other levels in the poll.

The SCs must automatically remove the display of the jackpot information on EGMs that are removed from the jackpot, or when the jackpot system is offline.

EXTJIP's as a 'Jackpot Display System'.

It was originally not the intent for the EGM's display of EXTJIP information to be the sole display of a jackpot system's current amounts at any time an associated Linked Jackpot Arrangement is in operation. (This is because an EGM's display of EXTJIP current amounts is typically cycled on an EGM's display, which does not meet OLGR requirements pertaining to the persistent display of all jackpot current amounts.)

However a Linked Jackpot Arrangement of QCOM v1.6+ EGMs may operate solely using the EGM's EXTJIP display on the condition the SC provides the following additional functionality:

The SC sends notification of all Linked Jackpot Arrangement wins via the SPAMB Poll (with the Fanfare Flag = 0) to all participating non-winning EGMs. This must handle simultaneous wins that may occur over any 60 second interval but limited to the maximum length of the SPAN text. The

SPAM notification of each win must remain with the EGM for 60 seconds before being removed. Example: “<level_x_name/s> reset due to win on another machine” or similar message. The intent is that players are kept current about all negative impacts concerning jackpots they are participating in.

4.7.7. Progressive Configuration Poll

The SC must use this poll to keep the EGM informed at all times of its game’s current LP details as applicable. (Also refer to section 4.9.3 on LP level adjustments.)

A SC may also use this poll after game configuration has been completed to customise a game’s SAP parameters.

Not all SAP games will support customisation of SAP parameters (support for this feature is indicated by the EGM for each game via the SAP Configuration Response), but for games that do, the SC must have the ability to change a SAP game’s configuration on demand from the CMS. Support for customisable SAP configurations is mandatory for QLD monitoring systems.

All progressive configurations used must be approved by the OLGR. A progressive configuration change will be allowed under the same rules as per a variation change (refer 4.7.4).

Progressive configuration changes/settings made with this poll must be verified by requesting the Progressive Configuration Response (also see 4.13.14).

4.7.8. Program Hash Request Poll

The SC must request a program hash from an EGM at the following times:

1. After the EGM resumes responding after any continuous non-responsive period **exceeding 10 seconds in duration**.
2. After the EGM resumes responding after a non-responsive period and a response (i.e. a Program Hash Response) to the last sent Program Hash Request Poll remains outstanding
3. After any SC power up or restart.
4. When requested to do so by the host system on demand / as desired at other times with the EGM Machine Enable Flag set at its current value.
5. Once per day at an arbitrary time (preferably during off peak hours).

The EGM Machine Enable Flag (MEF) in the Program Hash Poll must be set to disable (=0) in all cases except in relation to the last point above when it occurs during licensed gaming hours.

While the SEED field is optional in the protocol to allow lowering of the communications traffic load, always include it to be safe. The SC must ensure the EGMs are always provided with the correct seed. The SC must change the SEED once per day. Daily EGM Program Hash seeds and hash results will be provided to the operators by OLGR once per month. There is one seed for each day, which applies to all EGMs on the monitoring system that day and one corresponding hash result for each approved EGM item of software for each day.

The SC must be aware that since EGM responses may be pre-built, it is possible for an EGM to respond with a Program Hash result in response to a Program Hash request. To avoid accepting

an out of date program hash response, the SC must ignore the Program Hash response in this case.

4.7.9. System Lockup Request Poll

This poll may be used at the SC's discretion, for example to award prizes from external jackpot systems.

Notes on using "System Lockup" in QCOM v1.5 EGMs.

To more reliably get a QCOM v1.5 EGM into a System Lockup, the following SC procedure or similar is recommended:

1. Send System Lockup (SL) Poll (ensure EGM Acks it, keep trying until it does)
2. As a failsafe, also send General Maintenance Poll with MEF = 0 (ensure EGM Acks it, keep trying until it does)
3. Wait for a timeout period for GSR->STATE == SYSTEM LOCKUP
4. If timeout, then try resending SL Poll again but with MEF = 1 (just in case EGM has a bug and MEF=0 is preventing system lockup. The SC must also take into account that an attendant may inadvertently clear the SC's system lockup before the SC can even see the lockup has activated via the protocol**).
5. Wait another timeout period.
6. If still no System Lockup, then give up & log event with details (incl. last EGM GSR details for debugging purposes)

It is also recommend the SC periodically resends the SL Poll during the wait periods in case ** above occurs

The SC must not forget to re-enable the EGM via its MEF after System Lockup has activated.

Regarding the System Lockup timeout threshold: the SC should allow for very long plays in games with re-triggerable free games.

If this poll is used by the SC then it must handle the case where an EGM fails to enter the System Lockup after a timeout period. I.e. a SL timeout must be handled and not require manual intervention such as a RAM clear or reboot.

4.7.10. Cash-Out Request Poll

In QPv 1.5 this was formerly called the 'Cancel Credit Lockup Request Poll' which behaved as per its name.

May be used at the SC's discretion.

NB. With the new version of this command, in QCOM v1.6+ EGMs, in order to force a Cancel Credit Lockup, the system must first set COLLIM & TICKET parameters to zero in the EGM, send the cash-out poll, wait for a response (lockup) and then restore the parameters to their previous value.

4.7.11. EGM General Maintenance Poll

Polling frequency

- All defined Meter Groups.

Request all defined groups after every non-responsive EGM period and SC power up (but only after the meter exclusion period). This is fairly infrequent because EGMs send changed meters unsolicited in the Meter Contribution Response.

- The EGM Machine Enable Flag sent in this poll, is used to enable the EGM initially after the meter exclusion period.
- Multi-game/variation meters and SAP contribution meters (i.e. the progressive meters response)

Request after every:

- non-responsive EGM period and SC power up (after the meter exclusion period) for the current or last game in play.
 - \$100 of EGM turnover and at the end of an accounting period (i.e. at least once per day) for the current game in play.
 - new game is selected for play on a multi-game EGM for the de-selected game.
 - new variation is selected by the SC on a hot switching EGM for the switched-out variation.
 - RAM reset of the SC, for all games in the EGM.
 - SAP meters must also be requested at the first opportunity after every new SAP Award event is received from the EGM.
- LP Meters would only be requested when the SC is reinitialising after a SC RAM clear (i.e. if there was a loss of current LP amount in a local area LP system). This may seem unnecessary because LP meters are not used by the SC, but the LP contribution amount in the LP meters response is used. This is the only way for the SC to establish an initial value to the LP contribution meter for each LP game after a SC RAM clear. Failure to do this would result in the SC inadvertently considering the first LP contribution from a LP game as invalid.
- The SC should request Game Configuration via this poll after:
 - A new game is selected for play (there is an EGM event which indicates this) for the new selected game (if not already requested previously in the session).
 - A non-responsive EGM period or SC power up, for the current game in play (the current game in play is indicated in the EGM Configuration response).
 - An EGM initialisation after an EGM RAM clear has been completed for all games in the EGM to verify the configuration, and before and after any game is configured at

any other time.

- The Multi-game enable flags may be used at the SC discretion with respect to any OLGR requirements or directives. For example, a particular game in a multi-game EGM may be deemed unacceptable for use by OLGR at any time and be required to be disabled.

4.7.12. Request All Logged Events Poll

The SC sends a Request All Logged Events poll when either:

- It is re-initialising after a SC RAM clear and/or there is a possibility that one or more events have been lost, or
- After an EGM event sequence mismatch. (Only done once per session. Refer section 4.13.7.3 for more information.)

The intent is to allow the SC to attempt to recover any events it may have missed.

Note, if the SC receives an event in response to this poll it will always be a new event, it will never be the first event in the queue (this is a QCOM requirement). SCs must be careful not to re-synchronise their event sequence number on an event in response to the Request All Logged Events poll. However, do not ignore this event outright on the assumption it will be resent because if it is an unnumbered event, it will not be sent again.

After a Request All Logged Events Poll, the SC must disable the EGM (typically using the MEF) until all currently logged events have been received by the SC (2 consecutive Default Responses from the EGM indicate all events have been received). Once all events have been received then the EGM may be enabled again provided no other disabling conditions are current for the EGM. *(The main reason for disabling the EGM is mostly for LP games, so new LP award events cannot occur while the SC is still collating old events, as this would delay the processing of the new LP award event which is undesirable)*

While the SC is receiving events after a Request All Logged Events poll, the SC must be sure not to take action on events it has already processed and acted upon as this could cause serious problems in some cases. Examples of events that must only be acted on once:

- “EGM Processor Door Opened” (Refer 3.5, disables EGM).
- “EGM LP Award Events” (Refer 4.9.7, resets jackpot).
- “EGM Door Close” (As it is understood that some SCs also use the “EGM Door Close” events to trigger certain actions like resetting errors.)

4.7.13. Purging EGM Events

The SC must only ever purge events from its NV-RAM after the events to be purged have been stored fault tolerantly in the central monitoring system computer.

The SC must only ever purge events from the EGM after the meter exclusion period and the events to be purged have been stored fault tolerantly in the central monitoring system computer. The SC must also ensure that it does not send a purge during the Poll Sequence number reset procedure.

The SC must not send a new Purge Poll in a session until the last expected Purge Poll's Ack. Response has either been received or timed-out.

The SC must only purge EGM events up to and including the most recently fault tolerantly stored numbered event (i.e. SEQ <> 0) in the central monitoring system host computer. The sequence number on the purge poll must be used.

Monitoring systems may purge EGM events from the SC & EGM as often as desired but no less than once per day and always with respect to the above conditions. Host systems must purge events from SC & EGM on demand, automatically at the end of every host-SC session for dial-up systems and automatically at some arbitrary EGM/SC event queue level (e.g. 75%) for on-line systems. Purging more frequently than this is not recommended.

4.7.14. CRanE Configuration Poll

Sent on every new session to verify current CRanE configuration (section 4.3) and on demand by the SC whenever an EGM requires a change to its currently reported CRanE configuration, or when an invalid CRanE configuration is detected.

4.7.15. CRanE Lockup Acknowledgment Poll

Sent by a SC in order to acknowledge a CRanE lockup condition. Among other things (refer QCOM) this poll also allows the EGM to be subsequently reset from a CRanE lockup.

If the CRanE feature is not being actively used by a SC then this poll would never be sent to an EGM unless a problem was detected (such as an EGM unexpectedly appearing in a CRanE lockup).

4.7.16. Note Acceptor Maintenance Poll

OLGR formerly required SCs to disable \$50 and \$100 notes in all QCOM EGMs throughout QLD clubs and hotels (effective 12/2001 – 12/2013).

The following banknote denominations may be accepted by Queensland gaming machines (effective from 6 Dec 2013):

- \$5
- \$10
- \$20
- \$50
- \$100

The SC may disable/enable other notes at its discretion (e.g. at the venues request, or for example, to eliminate a problem with a specific note denomination until the Note Acceptor is upgraded).

The SC must send this poll once per EGM RAM clear, whenever the EGM resumes responding and whenever any of the defined parameters in this poll are changed in the monitoring system. The EGM must be kept up to date with the latest note acceptor parameters at all times.

For maximum flexibility, a set of these note acceptor parameters must be stored for each EGM in the monitoring system.

4.7.17. Hopper/Ticket Printer Maintenance Poll

This poll may be used at the discretion of the SC and operator but with respect to any OLGR requirements. OLGR mandates a default refill (REFILL) of 160 coins for \$1 token EGMs using the QCOM protocol. Also, the collect limit (COLLIM) is usually set at \$50 for a \$1 token EGM (either protocol) and the TICKET field should be set to zero unless TITO is in use in which case refer to the OLGR TITO Minimum Requirements document for the value to use here.

This poll must be sent by the SC once per EGM RAM clear, every new session, and whenever any of the defined parameters in this poll are changed in the monitoring system. The EGM must be kept up to date with the latest parameters in this poll at all times.

For maximum flexibility, a set of these parameters must be stored for each EGM in the monitoring system.

QPv1.6. The DOREFILL field may be used at the LMO's discretion.

4.7.18. Link Progressive Award Acknowledged Poll

This informs the player/attendant that the LP jackpot was verified and will allow the lockup on the EGM to be cleared.

Monitoring systems must have the ability to on demand, manually send a LP Acknowledgement Poll to an EGM if and when required. This must be a feature built in to the central monitoring computer. Refer to section 4.9.7 for other requirements for sending this poll.

4.7.19. EGM General Reset Poll

This poll may be used at the SC's discretion.

The STATE & FLG fields in this poll must be set accordingly to ensure that only the intended lockup or fault condition is cleared on the EGM by the SC. (I.e. STATE must not equal zero when FLG:bit1 is set.)

SCs need to be aware that an EGM may ignore a General Reset Poll if it considers itself in a "higher priority mode" (e.g. audit mode, or a LP win show). So any SC which uses this poll to automatically clear a condition on the EGM may want to periodically retry the poll for a time-out period before giving up. It is recommended that the retry and timeout periods in this regard be easily adjustable parameters in the monitoring system.

A SC should allow at least 5 seconds for the EGM to show some reaction to this poll via the protocol.

In QCOM v1.5.5, there can be situations where this poll is being used on a periodic basis (e.g. on sometimes hard to clear lockups such as LP lockups), which can result in the SC inadvertently clearing two lockups instead of one (e.g. an LP EGM can sometimes very quickly change from a

LP lockup to a CC lockup). In order to minimise the possibility in QCOM v1.5.5 EGMs of unintentionally clearing an additional or incorrect lockup, the SC should ensure that it only sends the General Reset poll immediately after a 'General Status Response' from the EGM and that the EGM was still in the lockup the SC wants to reset at that time.

Also in the above regard, it is recommended that this poll is not automatically re-sent again if NAK'ed by an EGM.

4.7.20. Specific Promotional/Advisory Messages

These polls may be used at the operator's discretion but with respect to the following requirements:

1. If an EGM is disabled by the SC for any reason/s (except for the meter exclusion period), the highest priority reason must be displayed on the EGM via the SPAM A message with FMT:bit 6 (Prominence flag) set. The highest priority message to display is determined by the order (if any) in which the conditions must be addressed in the monitoring system. Some mandatory messages to be maintained by the SC in this regard are:

Message	Duration
"QCOM: INVALID CONFIG"	During an invalid EGM/Game configuration condition.
"QCOM: INVALID HASH"	During an invalid EGM Hash condition.
"QCOM: INVALID METERS"	During an unreasonable meter increment until reset.
"QCOM: HASH TIME-OUT"	During an EGM Program Hash Time-out condition.
"QCOM: SENDING EVENT LOG"	After a Request All Logged Events Poll (4.7.12) during event resend
"QCOM: SEALED AREA ACCESS"	After any EGM processor door access (refer 3.5)
"QCOM: SC LOW MEMORY"	Refer sections 3.1 & 3.2.
"QCOM: DENOMINATION CHANGING SOON"	Refer section 4.7.2.
"QCOM: DENOMINATION CHANGED TO \$x.xx"	Refer 4.7.2. Where x.xx is the new credit denom. Special case; the EGM is not disabled during this message as a result of the change.

The SC must not forget to erase a message once it is no longer applicable.

2. The EGM should be updated with the current specific promotional message at the start of every session to ensure the correct message is displayed at all times.
3. It is recommended that a SC should not send SPAM polls to a single EGM any more frequently than once every 30 secs, unless it is considered a high priority. This is because EGMs often cycle SPAM with other messages on its display, but will give new SPAM messages priority according to QCOM requirements. So sending SPAM frequently can effectively lock-out other EGM messages from being displayed, which may not be acceptable.
4. While the EGM is enabled for play, the SC must also have the ability to periodically cycle through the transmission of up to 4 different arbitrary text messages to each enabled EGM, utilising the SPAM A message in a dedicated manner with FMT:bit 6 (Prominence flag) set. In the host, there must be eight messages (i.e. up to 4 x 80 character messages for QPv1.6

EGMs and up to 4 x 40 characters messages for QPv1.5 EGMs) plus a “display each message for” time value and the message cycle time (in the range 1...65000 minutes which is the time in-between the display of two messages) must be parameters per gaming venue in the monitoring system and must be able to be entered via the CMS host computer. To minimise QCOM LAN bandwidth usage, cycling of each message on the EGMs must be staggered. Any changes to the messages or cycle time made in the host system must take effect in all SCs within 24 hours. The OLGR will provide more information as to the actual messages for use with this feature at a later stage.

4.7.21. EGM Tower Light Maintenance Poll

This poll may be used at the operator’s discretion.

4.7.22. General Status Poll

This is the lowest priority poll. This poll must be sent by the SC when no other poll types of a higher priority are pending and when the EGM is declared not responding for the duration of the non-responsive period.

4.8. Broadcast Messages

The current date and time must be broadcast to all EGMs at the end of every poll cycle.

The SC must ensure that it never inadvertently broadcasts an incorrect date or time, especially after a SC RAM clear. Refer section 3.4 on time keeping for more information.

Note that an EGM expects to see a broadcast message between successive polls to its address or it will send a global broadcast negative acknowledgment within the next two responses.

It is not recommended that a SC use the Date and Time Broadcast to adjust for daylight savings, as changing this time could have side effects for Linked Progressive Award event validation and event time stamp validation for the SC. Alternatively, TZADJ is recommended for this purpose.

4.8.1. Clock Display Flag

This poll is new for QPv1.6. The CMS must maintain one clock display flag per venue. The setting for QLD monitoring systems must be ON (1). The flag must be not changed without the OLGR’s permission.

4.8.2. Site Enable Flag

The Site Enable Flag (SEF) must be used to close the site during non-licensed or non-gaming hours on behalf of OLGR (This also allows the EGMs to enter power save/screen save mode overnight). This is a regulatory requirement.

At this time a site's licensed gaming hours are linked directly to their liquor licence trading hours. Monitoring systems must support the site’s licensed trading hours with no restrictions. Consideration should also be given to handling 24-hour trading and special events.

Note that a site's licensed hours may vary from day to day and week to week, with special gaming hours on certain days of the year. Licensed gaming hours must be stored on a site basis and the monitoring system should be able to handle either site specific or global changes to licensed gaming hours.

A SC must be able to store at least 7 days worth of gaming licence hours.

The SEF is also used to disable the EGMs after a SC processor door access, or during a SC event log full or host offline event.

4.8.3. Linked Progressive Current Amounts

Packing LP broadcasts with more than one unique PGID per broadcast is permissible. Level ordering in the LP broadcast is also not important.

A SC must not broadcast PGIDs on a LAN, if the LAN does not contain any applicable EGMs. This is to help reduce the potential damage from the risk of a jackpot display system being setup with the wrong PGID and to help ensure that jackpot display systems are located in close physical proximity to the participating EGMs.

As per section 4.3, a LP EGM must not be enabled in a new session until it has been sent the latest LP current amounts applicable to all its games.

Scheduled LP broadcasts

Where one or more LP games exist on a loop, LP broadcasts must be sent once every four poll cycles, cycling through the applicable defined progressive groups as each LP broadcast is sent.

Note these broadcasts are essential as QCOM v1.6 LP EGMs apply a 60 second timeout to applicable LP Broadcasts. I.e. A LP EGM will disable if it does not receive a LP broadcasts for all its LP levels at least once every minute.

High Priority LP broadcasts

Additional LP broadcasts must also be sent out on the very next poll cycle after any detected or calculated negative movement of any current jackpot amounts by the SC. This is typically due to LP jackpots being won and very rarely will be to negative adjustments. The LP broadcast must contain all the groups and levels whose current amounts were detected as moving in the negative direction. (Backward movements in current amount are typically due to jackpots being won, but may also rarely be due to adjustments.) The reason for this requirement is to minimise the chance of simultaneous wins. This is the only time LP current amounts must be sent out urgently by the SC.

The system must always give the highest priority to resetting the jackpot current amounts throughout the network after a jackpot hit occurs to minimise the chance of a simultaneous win. Latency times in this regard must be minimised and will be deemed acceptable at the discretion of the Executive Director, OLGR. For example, latency times of up to 60 seconds may be considered acceptable for very infrequent (i.e. large) jackpots. More frequent jackpots must have proportionally lower latency times.

Low Priority LP Level Broadcasts (optional)

Low priority LP level broadcasts are optional to implement but are recommended for faster/ more responsive updates of LP current amounts for any LP EGMs in play. This has aesthetic value only and may add to player satisfaction.

The premise is that when the SC detects that EGM play has caused a one cent or more increase in any LP jackpot's current amount, it may queue those levels to be sent in any spare slots* in subsequently scheduled or high priority LP broadcasts. (This could also be further prioritised with respect to the amount of turnover in each case if desired)

(*there may be up to 8 levels in a single LP broadcast)

Prioritisation of low priority LP level broadcasts should be done via a cyclic check of all levels with new turnover and there should also be a check for efficiency purposes which ensures the same level is not sent twice in a single LP broadcast.

LP broadcast priority type summary:

1. Low priority: (optional) Refers to the packing of additional levels into spare slots in scheduled and high priority LP broadcasts. Results in more frequent and responsive jackpot display amount increments. Aesthetic value only.
2. Scheduled: LP broadcast every four poll cycles cycling through applicable PGIDs. (Essential to prevent LP EGMs going into LP broadcast timeouts.)
3. High priority: An immediate LP broadcast to inform the network of a win or negative adjustment. (Important as it lowers risk of simultaneous wins especially in rapid jackpots)

4.8.4. General Promotional Message

This poll may be used at the operator's discretion (e.g. 'Happy Hour from 5-6pm tonight') but with respect to the following additional requirement:

If the SC, for any reason disables the site (e.g. SC Event Log Full), the highest priority reason must be displayed on the EGM via this broadcast message. For example, some mandatory messages to be maintained by the SC in this regard are:

<u>Message</u>	<u>Period</u>
"SC QUEUE FULL"	During a SC event or meter log Full Condition.
"SC OFFLINE/DISABLED"	This message must be displayed on the EGM whenever the monitoring system is down or it is not possible to leave the EGMs enabled for security reasons (e.g. SC processor door opened & SC program hash failure, host timeout, hash failure, etc). This message should be substituted or supplemented with a more verbose explanation for the reason for the disable.

The SC must be sure to erase a message once it is no longer applicable.

4.8.5. EGM Poll Address Configuration

Sent periodically (suggest every 2nd poll cycle) by the SC whenever one or more EGMs under it are declared non-responsive. The broadcast must contain the unresponsive EGM poll addresses and serial numbers.

This broadcast must also be sent out periodically for EGMs currently responding. Each responding EGM's details must be sent out in this broadcast at least once every 3 minutes.

Poll Address values may be arbitrarily assigned by the monitoring system but with respect to 4.8.5.2 below. The monitoring system may change an EGM's Poll Address at its discretion, but attention should be paid to the issues in 4.8.5.1 below.

4.8.5.1. Notes on changing EGM Poll Addresses

An EGM will only accept a new poll address upon power up, or if it is in a communications time-out, or communications defaults (e.g. also caused by 3 NAKs on a QPv1.6 EGM).

QPv1.5:SCs must be aware that just because an EGM is not responding to polls on its old poll address that the EGM is not still seeing those polls and therefore the EGM would not have entered a communications timeout. A break in the loop (communications fault) could cause this situation.

To ensure QCOM v1.x EGMs will pickup a new poll address, a SC must specifically stop polling the old address for the QCOM protocol communications timeout period (10 sec).

Warning: Site Controllers that assign new poll addresses for each communications session with an EGM, in the case of a broken loop also occurring, that this can fill up an EGM's event queue with Communications Timeout events.

Beware in QPv1.5 EGMs, it is possible to put the EGM into a limbo state by assigning the EGM a poll address (via the PA broadcast) and never sending a poll on that address. A QPv1.5 EGM will not re-enter a communications time-out once it has been assigned a poll address (and therefore accept a new poll address), until it has either received at least one poll on the previously assigned poll address, or powered down. This means that it may not be good practice on a QPv1.5 EGM to change, or keep changing a poll address for an EGM that is not responding.

4.8.5.2. Reserved Poll Addresses

All EGM poll addresses assigned by the monitoring system must be within the range 1...64 inclusive. Poll addresses in the range 128...192 inclusive are reserved for the monitoring system use. All remaining addresses are reserved by the OLGR for future expansion.

4.8.6. Site Details

The SC must ensure all EGMs at the site are kept up to date with the current site details at all times. Thus this message would be sent after every EGM RAM clear and whenever the site details change.

For easier backward compatibility, SCs that are supporting both QCOM version 1.5 and 1.6 EGMs may use only the QCOM version 1.5 version of the SD broadcast.

For venues utilising ticket printers, Site Details must also be sent whenever one or more EGMs resume responding to the SC.

4.9. QCOM Linked Progressives

QCOM Local Area Linked Progressive jackpot support is a mandatory component for SCs operating QCOM EGMs.

Occasionally a 'jackpot system totaliser' will be referred to in these requirements. This refers to the device (usually the SC in a LAN jackpot system, or the Central computer in a WAN jackpot system) which adds up the LP contributions and controls the value of the current jackpot level amounts.

The OLGR document entitled "Jackpot Systems Minimum Technical Requirements" also applies to QCOM LP and should be consulted.

Adopt the policy WYSIWYW (What You See Is What You Win) but with respect to other eligible (or simultaneous) winners of the same jackpot.

For Link Progressive jackpots where the LP component is a part of the theoretical percentage return to player, SCs and systems must always ensure the LP percentage component is always returned to the player in full (including all overflows). This means if the jackpot system totaliser is off-line that the EGMs on the jackpot must also be disabled. No contributions may be lost.

4.9.1. General

4.9.1.1. Monitoring systems must be able to support at a minimum, one LP group per EGM, with up to 8 levels per group. The ability to run QCOM LPs across multiple SCs or across multiple venues is not mandatory. There must be no limit on the number of EGMs per group on a SC except that which is the normal EGM limit for a SC. The SC must support multiple LP jackpot triggers per play from an EGM, however the SC may assume that an EGM will not log a new LP award event until the first LP award has been LP Ack'd (via the QCOM LP Ack Poll) and its LP lockup condition is also cleared.

4.9.1.2. Creating QCOM LP jackpots

SCs must ensure that before any QCOM LP EGMs are enabled for play, all progressive groups & levels for the EGM are first setup in the SC and that the jackpot system totaliser is on-line.

4.9.1.3. QCOM LPs must be only configurable in the host system computer by authorised personnel and from OLGR approved LP variations.

4.9.1.4. Deleting QCOM LP jackpots

The SC must not allow any progressive levels of a group to be deleted for which any EGM under it is contributing to. All participating EGMs must first be either removed or have their PGID changed.

4.9.1.5. Upon deleting a QCOM LP jackpot the current jackpot contribution; LPCAPO - R (refer calculations section 4.9.4) must not be discarded (OLGR policy). The current contribution must be added to another LP or SAP jackpot in the first

instance, or where this is not possible then refer to the OLGR jackpot system policy document for other options.

- 4.9.1.6. The monitoring system must maintain for each QCOM link progressive jackpot level, at least the following meters and parameters:

Jackpot Level Static Parameters:

Jackpot Level Name & number
Level creation/last change date and time
Progressive group ID (PGID)
% increment (%inc)
Reset/StartUp amount (R)
Ceiling amount (C) (limit of the progressive prize, overflow is stored in total contribution meter)
Autopay amount (AUTOPAY) (Refer section 4.9.6)

Jackpot Level Meters: (Non-volatile)

Total LP Contribution (turnover, before % taken) since last hit (TURN)
Current amount (or total contribution since last hit)
Total Hits (H) (count)
Total Wins (W)
Total Wins Successfully ECT'ed to the EGM (WECT)
Total Number of detected simultaneous wins (NUMSWIN)
Total Overpay due to paying in full all simultaneous wins (OPAY)*

**Refer to sections 4.9.5 & 4.9.7. The OPAY meter is required in order to be able to reconcile a LP jackpot level which has had simultaneous wins. Normally the progressive component of LP prize is fully funded by the prize's percentage increment (there is no surplus or deficit like when funding a fixed prize). However when a jackpot system elects to pay all eligible winners in a simultaneous win situation in full (as opposed to equally sharing the progressive component among the eligible winners), theoretically speaking, additional funds will be required to cover this cost, the OPAY meter represents how much additional funds have been required in this regard. If this amount was not metered then the jackpot would not be able to be reconciled or audited.*

All meters must be at least 32 bits or larger (unsigned integers) and in cents unless stated otherwise.

If floating point numbers are used anywhere, they must be at least *double* precision floating point numbers (i.e. 64 bits or higher), as single precision floating point numbers (32 bit) will start to lose precision as low as approximately \$99,999.99.

- 4.9.1.7. Static parameters must be stored in the host computer as well as any applicable SC.
- 4.9.1.8. Current Jackpot Level Meters must be sent to the host computer once per day, for every new host-SC session upon connection and level deletion. Jackpot Level Meters must be time stamped to identify how recent they are in the system.
- 4.9.1.9. LP jackpot current level amounts must be fully reconcilable from meters and adjustment events stored in the monitoring system.
- 4.9.1.10. Progressive increment amounts must have no more than 4 decimal places.

4.9.2. LP Contributions

- 4.9.2.1. LP Contributions packets may be received from an EGM by either the Progressive Meters Response or the Meter/Group Contribution Response, via the LP Contribution meter. The SC must process the LP Contribution meter in both responses for the purpose of adding contributions to the jackpot (this ensures the SC will never miss a contribution even if it or the EGM was RAM cleared).
- 4.9.2.2. All contributions must have a reasonableness test applied. Refer section 4.13.10.
- 4.9.2.3. To correctly calculate increments to a QCOM LP jackpot level the SC must maintain one LP contribution meter per LP game per EGM.
- 4.9.2.4. QCOM LP jackpot systems must be able to handle jackpots with % increments from zero to 100% to at least four^{QPv1.6.1} decimal places. (NB QPV1.5 was three decimal places)
- 4.9.2.5. QCOM LP jackpot systems must be able to specifically handle a jackpot with a % increment of zero (beware of divide by zero problems especially when a hit occurs). I.e. A fixed prize.
- 4.9.2.6. There must be no rounding errors which would prevent perfect jackpot amount reconciliation in a QCOM LP jackpot system at any time. I.e. it must be possible to reconcile a jackpot level using a formula such as in 4.9.4.3 at all times and without rounding errors causing an imbalance over time. Sometimes special consideration needs to be given upon resetting a prize upon a win (e.g. to avoid accidentally losing or truncating a fractional part of a current amount in the reset process).

4.9.3. Adjustments

- 4.9.3.1. The monitoring system must have the ability to make +/- delta adjustments to the current Jackpot Level Meters of a QCOM LP jackpot level. (NB there are restrictions on negative adjustments facilities, refer Jackpot System Minimum Requirements)

The possible reasons for adjustments to Jackpot Level Meters are:

- Addition/subtraction of contribution affecting the current amount as a result of lost or superfluous turnover to the jackpot. Usually all levels in a jackpot need to be adjusted. This event should be rare, as all unreasonable contributions should be ignored.
- Carrying over contributions from a decommissioned jackpot.
- The addition of a LP award for a LP award event which was inadvertently deemed invalid, e.g. as a result of time synchronisation/clock drift problems.
- The deletion of a LP award for a LP award which was inadvertently deemed valid. (This should never be required. All instances of an LP Award being inadvertently deemed valid must be reported in writing to OLGR with full details.)
- Problems with the jackpot system. All bugs must be reported to the OLGR.

- 4.9.3.2. A negative adjustment to current contribution must not be allowed which results in a LP current prize amount of less than its reset/start-up value.
- 4.9.3.3. Occasionally a venue will desire to change their QCOM LP variation from one approved LP variation to another. Any adjustments to live QCOM LP level static parameters must be approved by OLGR and from the approved list of LP jackpot variations for the game. This should be infrequent.
- 4.9.3.4. LP Variation changes must be performed as a deletion/creation operation of the jackpot levels.
- 4.9.3.5. All changes/adjustment to a LP jackpot must be tracked via an audit trail. SC LP Level Created/Deleted/Adjustment events will suffice.
- 4.9.3.6. When a change in LP variation is performed, to maintain the correct percentage return for the EGMs, the current jackpot contribution (i.e. the LP Current Amount minus the start-up) must be carried over for each level to the new jackpot. For example:

Current R = \$100 INC = .5% and LPCA = \$125.00
New R = \$50 INC = .25% then LPCA = \$75 (carry over \$25 regardless of %INC)

Depending on the value of the new start-ups, as demonstrated above, altering jackpot parameters can have the adverse effect of causing the current amount to go backwards. A venue may either decide to deal with any adverse reactions; however it is also acceptable for the venue to make up the difference at their own expense at their discretion.

- 4.9.3.7. Depending on how the LP jackpot maths is implemented, an adjustment may create a special case where a LP jackpot is adjusted or changed and the current amount now works out to be greater than the ceiling. This case must be handled if applicable. The ceiling must always apply and any amount over is carried onto the overflow.
- 4.9.3.8. Another special case to handle (depending how LP jackpot maths is implemented) is when a jackpot becomes a fixed prize jackpot (%INC of zero)

as a result of a LP variation change. There will be some contribution to be carried over. The jackpot system may not be able to handle a fixed prize level that has contribution. The SC may either not broadcast the LPCA correctly or it may not reset the LPCA correctly after being hit. If this is a problem then it is acceptable just to add the carry amount to another level and have the system not allow adjustments to a fixed prize level.

4.9.4. LP Calculations

The formulas in this section are for a basic LP. E.g. hidden increments or other features are not considered.

Note that PAMT in this section refers to the reported LP Win Amount in the LP Award Event.

TURN = 'total turnover since last jackpot hit'
 R = Reset or Start-Up amount
 C = Ceiling
 %inc = Jackpot percentage increment

4.9.4.1. LP Current Amount Plus Overflow (LPCAPO)

Representation of the LP Current Prize Amount is in terms of 'total turnover since last jackpot hit' & 'reset amount':

$$\text{LPCAPO} = \text{TURN} * \%inc. + R$$

The above amount includes overflow. NB only when broadcasting LPCA, apply the ceiling.

I.e. $\text{LPCA} = (\text{LPCAPO} \leq C) ? \text{LPCAPO} : C;$ // in "C" notation

4.9.4.2. Resetting the LPCA after a jackpot

This reset example operates wrt a jackpot totalised on the Turnover contribution, not the LPCA as this inherently avoids rounding errors on jackpot reset. (This isn't meant to imply it is not also acceptable to totalise a jackpot in units of LPCAPO. The main point is to not lose partial amounts during the reset process)

Assuming Jackpot prize passed authentication checks, then in C notation:

```

if (PAMT > LPCA) { // simultaneous win?
    OPAY += PAMT - R - TURN * %inc;
    TURN = 0;
    NUMSWIN++; // sim. win count
    LogSimWinEvent();
}
else {
    if (%inc <> 0.0)    TURN = TURN - ((REPORTED PRIZE) - R) / %inc;
}

```

```
else          TURN = 0;
}
```

4.9.4.3. Reconciliation of a jackpot level (assumes no adjustments/fills, hidden increments, etc)

$$\text{LPCAPO} = (\text{TURN} * \% \text{inc.}) + ((\text{H}+1) * \text{R}) - \text{W} + \text{OPAY}$$

or for a period use:

$$\text{Closing LPCAPO} = (\text{TURN} * \% \text{inc.}) + (\text{H} * \text{R}) - \text{W} + \text{OPAY} + \text{Opening LPCAPO}$$

4.9.5. Sharing of QCOM Linked Progressive Jackpots

Simultaneous jackpot wins are possible with QCOM LP jackpots.

In QCOM LP, a simultaneous win is said to have occurred, when on one EGM, a jackpot occurs and then on one or more other EGMs, another jackpot for the same level occurs before the current jackpot amounts displayed on those other EGMs could be reset. A simultaneous win is detected in QCOM when a LP Award event's amount is greater than the currently LPCA for the jackpot level.

Sharing a simultaneously won jackpot is an option under QLD legislation as opposed to paying all simultaneous winners in full. However it is OLGR policy for Jackpot levels which have an ECT threshold set (non-zero AUTOPAY), for all simultaneously won jackpot amounts to be paid in full.

The jackpot system must detect all occurrences of simultaneous wins of a LP jackpot but must automatically default to payout all LP jackpots in full regardless of other eligible winners. If a large jackpot had to be shared then it can be done via a manual adjustment.

To minimise the probability of a simultaneous jackpot, the system must give the highest priority to resetting jackpot level current amounts throughout the network after a jackpot level hit occurs. Latency times in this regard will be deemed acceptable at the discretion of the Executive Director, OLGR.

In the case of opting to share a simultaneous progressive jackpot level win, the jackpot start up amount must be paid in full to all eligible winners, then the contribution portion (LPCA - Start up) of the largest of the reported jackpot amounts (there may be a small difference due to communications latency) is shared equally among the eligible winning players.

The operator must give clear notification and details to the player and venue staff if a LP jackpot is to be shared.

Automating sharing of jackpots in the system is not recommended because it is unlikely a simultaneous win of a large enough amount, will occur that it cannot be paid in full to all eligible winners. Auto sharing support would require a lot of coding and work to handle a highly improbable event.

If a LP jackpot is ever shared due to a simultaneous win, full details and an event report must be submitted in writing to OLGR.

4.9.6. Automatic resetting of small EGM progressive awards lockups

Monitoring systems must allow an arbitrary AUTOPAY amount (in \$.¢) to be setup for each defined QCOM progressive level. AUTOPAY must control whether a LP award will be automatically added to the EGM's credit meter and reset, or be a manual payment. The intent is for small or frequent jackpots to be auto-paid / to the EGM's credit meter and auto-reset in order to avoid placing a strain on the gaming venue resources. The AUTOPAY default value must be zero.

AUTOPAY must be implemented as follows:

When a progressive award occurs on an EGM and the SC has authenticated the award and sent the 'Linked Progressive Award Ack. poll', if the award amount is less than or equal to the AUTOPAY amount, the SC must automatically transfer the award amount directly to the EGM's credit meter via an 'ECT to EGM poll' and then reset the progressive lockup via the 'EGM Reset poll', returning the EGM to play. (QPv1.6) Note that after receiving the 'LP Ack Poll', the EGM may spend some time performing a win show or win animation in which time it will not act upon or queue any received 'General Reset Poll's. Accordingly, the SC must periodically resend the 'General Reset Poll' until the EGM finally resets from the LP lockup.

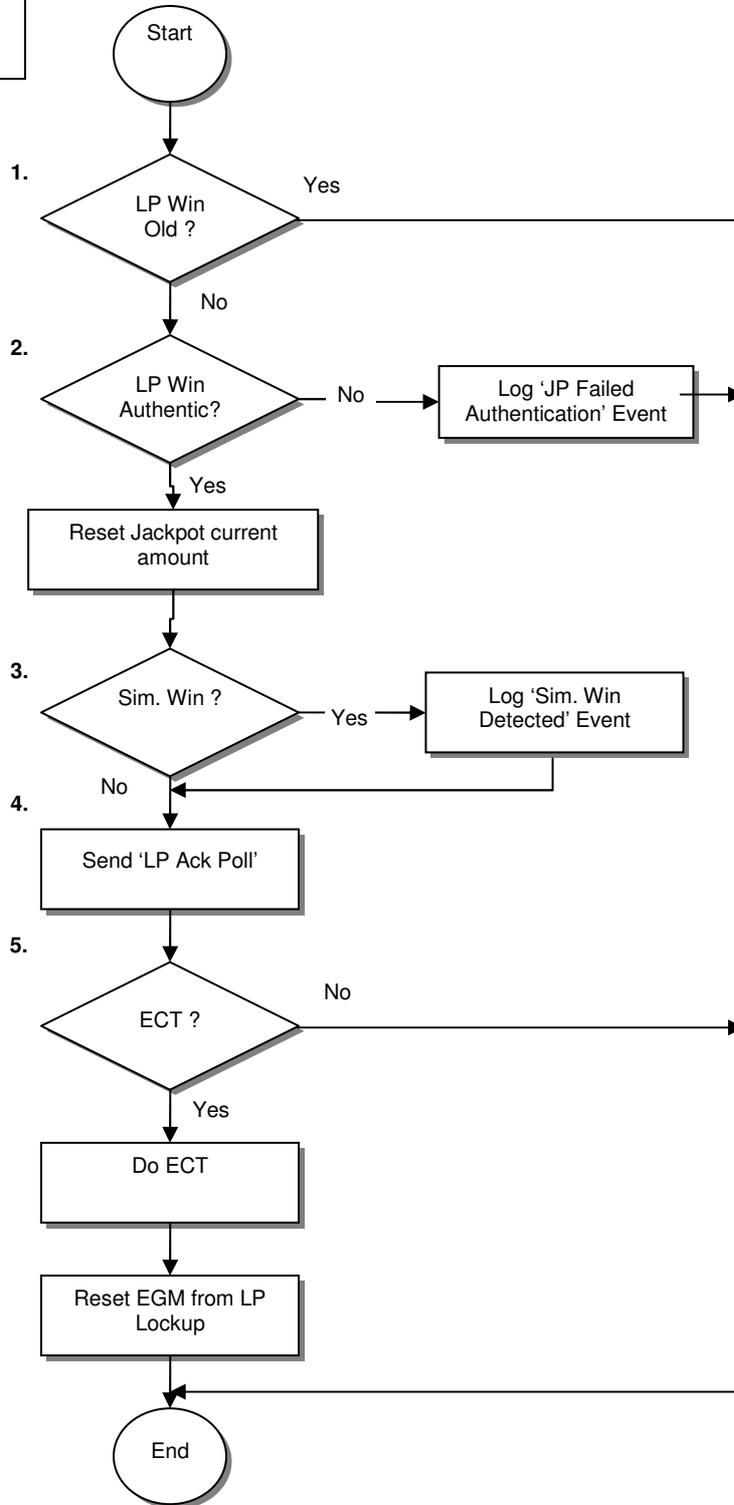
If the progressive award was greater than the AUTOPAY amount, then the SC leaves the progressive award lockup to be manually cleared by an attendant as normal.

Refer to Section 4.9.7 on the jackpot win procedure and section 4.11 on how to perform an ECT.

To date the OLGR has approved AUTOPAY thresholds up to ~\$750. This limit is negotiable in proximity to this amount to suit a given jackpot level parameter set or gaming venue (e.g. higher limits are typical in Casinos). If a higher value is desired the operator should contact the OLGR.

4.9.7. LP Jackpot Win Procedure

Numbers correspond to steps explained on the next page.



When a jackpot win occurs, the system must perform the following procedure:

PAMT is the reported LP Win Amount in the LP Award Event.

1. The first thing the SC must do is to check if the LP Award event has been previously processed and simply ignore the LP Award event if it has already been processed. Filtering out 'aged' LP awards eliminates the problem of generating many LP Award failed events if the SC sends a request events poll to a LP EGM.

(Unfortunately the most convenient way to do this in QCOM at this time is via time-stamps. Using time can be risky due to time synchronisation/clock drift issues that can occur and therefore is not recommended as general practise or for new systems if it can be avoided (for example using sequence numbers instead). However, QCOM does synchronise time every second so the risk is reduced over the local area.)

To check for this, the SC must maintain a new NV variable per EGM, which equals the date and time stamp of the last successfully processed and accepted LP Award event (LASTLPTIME) for the EGM. (The SC must also be sure to initialise the LASTLPTIME upon EGM commissioning to the current date and time.)

Then for any received LP Award event, if its time stamp is not greater than LASTLPTIME⁴ then the award is deemed old and not processed. Exit this procedure.

If the time is greater than LASTLPTIME then the SC must update the EGM's LASTLPTIME variable with the current date and time and continue this procedure.

(If the system is changing its time with respect to daylight savings then this would have to be taken into account in the above time comparisons.)

2. As quickly as possible, authenticate the LP jackpot event (refer 4.9.8).

If the LP jackpot award event did not authenticate, the SC/jackpot system must log the '**SC-EGM LP Award Ignored - Failed Authentication Checks**' event (refer 4.14.1.22), indicating the last LP jackpot from the EGM was invalid and exit the procedure. *(Do not reset the LP jackpot amount or disable the EGM, or acknowledge the jackpot (via the LP jackpot Ack Poll) on the EGM. Any further action will be via manual intervention.)*

If the LP Award event was valid, the SC must immediately reset the jackpot and broadcast it throughout the network. Update the jackpot level current amount, total hits and total wins.

Notes on resetting the jackpot current amount.

If $PAMT > LPCA$ then the jackpot must simply be set to the start-up amount (R) (i.e. Set TURN = 0. Refer section on QCOM LP calculations). A simultaneous win is assumed to have occurred. $PAMT - LPCA$ is the amount of overpay which will

⁴ This means that an EGM cannot log two separate LP Awards with the same time

occur when the jackpots are all paid in full, which is always the case. This amount is added to the OPAY meter.

If $PAMT \leq LPCA$, then the new LP current prize amount must be calculated by subtracting the amount (in units of turnover) of the reported jackpot win amount in the LP Award event minus the startup amount, from the current LP jackpot TURN amount (refer section on QCOM LP calculations).

3. Simultaneous win detection.

If in point 2. above, if PAMT was greater than the LPCA then this indicates either a simultaneous win or possibly an aged or delayed⁵ LP Award event has finally made it through, a corrupt LP award (unlikely). The system must assume it was a simultaneous win as this is the most likely scenario. The simultaneous LP jackpot event must simply be logged.

Continue the procedure as normal.

4. Send the LP Ack. Poll to the EGM.

5. The SC must then check the auto-reset threshold (section 4.9.6).

If the win is above the threshold then take no further action and exit the procedure.

If the win is less than or equal to the threshold amount then the SC must perform an ECT of the amount of the LP award (section 4.11) and then reset the EGM from the lockup.

Note that when the SC is trying to reset an EGM from a LP Award lockup via the General Reset Poll, the SC, depending on timing, may have to try a number of times before the EGM will reset. This is because an EGM performing a LP win show is allowed to ignore General Reset Polls until it has finished the win show. An alternative approach is for the SC to have a configurable delay between the LP Ack Poll and the General Reset Poll to ensure the LP win show is finished before trying the General Reset Poll. (NB be aware that when using the General Rest Poll there is also always the possibly the EGM may be in a higher priority state such as a door open or fault condition.)

The SC must be able to automatically recover from any form of interruption to this procedure other than a SC or EGM RAM clear.

4.9.8. LP Jackpot Event Authentication

LP jackpot event authentication must be performed on every received LP award event except previously processed (old) or duplicate LP Award events which are now simply ignored. Refer previous section.

⁵ E.g. if an EGM lost communications for an extended period before being able to transmit a new LP Award event.

Before accepting any LP jackpot event from an EGM as valid and updating/resetting the jackpot current amount, the jackpot controller must first verify the following items:

- 4.9.8.1. The date and time stamp of the LP award event must be a valid date and time. Refer to section 4.13.7.4 on event responses regarding validating a date and time stamp.**
- 4.9.8.2. The PGID & PLVL fields in the LP jackpot award event are valid.
- 4.9.8.3. The GVN & VAR of the LP jackpot award event are correct
- 4.9.8.4. The EGM is actually enrolled in the jackpot as identified by the PGID in the event.
- 4.9.8.5. Progressive Win Amount (PAMT) \leq jackpot ceiling value if one exists.
- 4.9.8.6. PAMT \geq reset or start-up amount.
- 4.9.8.7. The date and time stamp of the LP award event must be greater than, or equal to the last jackpot level hit time minus 10 seconds⁶. (a date and time per LP level must be recorded in the NV RAM of the jackpot system/SC denoting the last LP jackpot hit time in order to perform this test. If no hits have occurred yet (i.e. new jackpot or RAM cleared SC), then the last LP jackpot hit time per level value must default to the jackpot inception/SC RAM cleared time).**

At this stage the LP jackpot is considered valid if all the above tests passed. Otherwise the LP Award event is considered invalid. Return to section 4.9.7.

There may be other acceptable methods of authenticating a LP award event not listed here.

Note for QCOM v1.6 EGMs, the LP Award event (0x1000) now requires a bit mask (to mask out unused bits) when processing the level ID number.

**Note that time synchronisation/clock drift management across the EMS is crucial in QCOM LP jackpots and issues will occur with Linked Progressive jackpots if this is not well managed by the EMS.

4.10. EGM Machine Enable Flag

An EGM must be disabled by the SC via the EGM Machine Enable Flag during the following periods:

- During the meter exclusion period.
- When told to do so by the system at other times or when directed to do so by OLGR.

⁶ This value is highly negotiable and should at a minimum be an editable parameter in the EMS (preferably per jackpot level) to allow adjustment. The value in this section may need to be increased to handle potential larger network latencies (i.e. WAN jackpots) and may be increased at the discretion of the LMO. (NB. This test has an issue in that it may fail to perform as intended in the case that there is a communications timeout preventing a new LP award event from reaching the controller and another jackpot is hit in the meantime.)

In general, any reason for an EGM to be disabled by the SC or monitoring system for an extended period (i.e. some error or invalid data was received from the EGM) should be an event in the monitoring system.

4.11. ECT

The primary intent of the procedures in this section is to ensure that QCOM ECT is auditable and that there is no possibility of a lost or duplicated ECT.

ECT is used for cashless (or card based) gaming and may also be used by operators for the transfer of small prizes directly to the EGM's credit meter (refer AUTOPAY section 4.9.6). It may also be used for transfers in relation to non-QCOM based TITO systems.

Monitoring systems performing any ECTs must keep separate totals of **successful** transfers per transfer type **per EGM**. E.g. Different types of ECT may include; QCOM LP, promotional jackpot 1, promotional jackpot 2, cash-less player loyalty system and so on.

If the ECT is associated with an account then an event must be logged in the system for the ECT which includes a public account identifier. However, do not put private or sensitive information into these events.

The above ECT Meters must be sent to the host computer once per day and every new host-SC session upon connection. ECT Meters must be time stamped to identify how recent they are in the system.

If there is more than one source of ECT at a venue, then the venue must be given monthly written reports separately totalling each type of transfer allowing them to reconcile their manual payments with each type of ECT.

Some other general issues to note with ECT:

- In full cashless operation, if an EGM is in cashless mode, avoid ordering the EGM out of cashless mode via the ECT to EGM Poll, as it can lead to unpredictable behaviour in some EGMs if an ECT from EGM lockup occurs at the same time. Instead, always allow the EGM to return from cashless mode automatically.
- At this time, to implement ECT in QPv1.5, the SC must implement cashless meter response time-outs to reconcile the meter movements and the ECT Poll Sequence Number. This is not an easy thing to perform at present, but must be done (this will be made easier in the next QCOM protocol release QPV1.6).
- Be aware of strict ECT group meter change monitoring requirements (Refer 4.13.9.2).

4.11.1. ECT to EGM

Every SC attempt at an ECT must have an 'SC ECT to EGM' Event logged (4.14.1). Any failure of an attempted ECT to EGM must have an 'SC-ECT to EGM Timeout' event logged.

In QCOM v1.5 EGMs, upon every 'ECT to EGM Poll' attempted by the SC, in order to determine if the transfer was successful the SC must expect a Group Meters Response containing the

Cashless-In meter. If the expected meter times-out*, then the SC must consider the transfer as failed.

*timeout detection is not easy; the SC has to implement a timeout of the meters response and a timeout of the expected meter within the response all wrt higher priority responses and meters. For QCOM v1.6 EGMs, the SC may optionally use the new ECT-To-EGM Acknowledgment Response in order to verify each ECT-to-EGM as the new ECT-To-EGM Acknowledgment Response makes ECT-to-EGM easier to implement on QCOM v1.6 EGMs (w.r.t. ECT PSN timeout detection & Cashless-In meter verification).

Upon an ECT-to-EGM failure, the SC must also manually request group meters in order to get the cashless-in meters to double check if the transfer was really unsuccessful.

If an ECT to EGM fails then the SC must follow the PSN recovery procedure (Refer 4.13.3.3), after which the SC may either retry the ECT, or if the ECT was for a jackpot payment then leave the EGM locked up for a manual payment instead.

The SC must ensure that for QPv1.6 EGMs that it never attempts an ECT that is greater than the MAXECT threshold it has set on the EGM.

Be aware on a QPv1.6 EGM, the CM bit is not processed anymore if the PSN is invalid. On a QPv1.5 EGM the CM flag was always processed regardless of the validity of the PSN field.

The SC must not send a new ECT-To-EGM Poll in a session until the last expected ECT-to-EGM Poll Acknowledgement Response (QPv1.6) or meters (QPv1.5) has either been received or timed-out.

The ECT source ID field must be populated correctly in accordance with the table in QCOM.

4.11.2. ECT from EGM

An ECT from an EGM would only be allowed to be used at this time for example, for an externally controlled ticket printing system and must not be used for full cashless operation until approval to do so is granted by the OLGR. Each implementation will be considered on a case by case basis.

A QPv1.6 EGM will not perform an ECT out on zero credit like a QPv1.5 EGMs 'may' do. (*Some QPv1.5 EGMs were granted an exemption from this QPv1.5 requirement)

SCs must be aware of the new event code (0x3009) for the "EGM from EGM Event" in QPv1.6 EGMs (was 0x2004 in QPv1.5 EGMs)

In a QPv1.6 EGM there will be a delay of at least 5 seconds upon exiting an ECT-from-EGM lockup condition when the ECT is denied. (The QPv1.6 EGM has to display a failure message for 5 secs)

Following is an example of an ECT-from-EGM procedure when instigated by the SC (e.g. a player has the ability to remove their card on demand). (This should handle both QCOM v1.5 & v1.6 EGMs & special cases for example; when the player has played down to zero but has a win they have not yet taken)

Pre-condition: EGM is in Cashless Mode.

1. Send the ECT-from-EGM lockup request.

1a. It is also suggested that the SC send MEF = 0 via Gen. Maintenance Poll (this forces the EGM into a more manageable state in case of timeout issues).

If the EGM enters an ECT-from EGM lockup at any time during this procedure, then break out of the procedure, reset procedure state, send MEF = 1* and handle ECT-from-EGM lockup.

2. Wait** for two consecutive General Status Responses with a STATE== idle mode & no faults & doors closed etc.

3. If the credit meter (by formula) != 0 and no ECT lockup state received yet (in a GSR), then send another ECT-from EGM lockup request.***

4. Wait again** for two consecutive General Status Responses with a STATE== idle mode & no faults & doors closed etc.

5. Still no ECT from EGM state? If no, then log a critical error event, **report the EGM's SSAN to OLGR**, force EGM out of cashless mode and send cash-out poll + MEF =1* via Maintenance Poll. (Possibly send SPAM to EGM e.g. "Cashless transfer failed")

6. No ECT lockup expected. Send MEF=1*, force EGM out of cashless mode, exit procedure.

**Before sending MEF=1, double check first if it is ok to send MEF=1 as there may be other conditions in QCOM whereby the SC should keep the EGM @ MEF == 0.*

***Suggest waiting indefinitely but with the ability for an authorised user to force the procedure to exit via point 6 on demand.*

****This 2nd chance to handle the case where some EGMs prior QPV1.6.3 when not in idle mode, ignored the ECT-from-EGM lockup request if the credit meter was zero at the time, even though the credit meter may not equal zero upon next return to idle mode. Refer QCOM for more information.*

This is just one example of a method for a SC instigated ECT lockup. There would be other ECT-from-EGM procedures that would also work fine. For example, another method is to wait until the EGM is in Idle Mode first, before sending the ECT-From-EGM Lockup request poll.

4.12. TITO

The requirements in this section are only applicable to QCOM TITO as defined in section 22 of the QCOM Protocol document. This section is not applicable to any other type of TITO system, for example externally based TITO systems (i.e. where the EGMs are TITO unaware).

Support for TITO is optional.

4.12.1. General

As required QCOM procedures concerning QCOM TITO are evident and discernable given the methods provided in the QCOM Protocol document, this section is not providing a full set of poll-by-poll; response-by-response set of requirements. Instead, this section lists principles for SCs and TITO systems concerning a TITO implementation via QCOM. This prevents the requirements from constricting system design which does need to vary depending on the intended operating and regulatory environment. However, this does mean that an evaluation of a TITO system solely against this document and the QCOM protocol document does **not** constitute a full TITO system evaluation. Each TITO system also needs to be evaluated with respect to its unique design, operating environment, level of risk and general fit-for-purpose as a cash transaction system.

General principles:

- Refer to the QCOM Protocol document for a section with notes concerning AUTHNO generation.
- The SC / TITO host system must ensure it is able to apply all the limits as set in all applicable and related OLGR TITO Minimum Requirements documents. Note, a QCOM EGM will only apply MAXECT to an amount in a TI Ack Poll; thus the SC / TITO host system must be able to apply any other TI/TO limits as set by the OLGR TITO Minimum Requirements document.
- During a ticket-out process, the TITO system must record a potentially claimable ticket in the system at the time the QCOM TOR Ack Poll is transmitted to the respective gaming machine.
- During a ticket-in process, the recommended way of determining if a positively acknowledged TI transfer was successful is via receipt of a Group Meters Response containing the Total EGM Cash Ticket In meter with the expected increment. If the expected meter and increment thereof times-out in a responding EGM*, only then should the SC consider the transfer as failed.

**NB QCOM meter/meter group timeout detection requires the SC to implement a timeout of the group meters response as well as a timeout of the expected meter within the response all with respect to higher priority responses and meters, as well as correctly handle potential the EGM going non-response or SC re-starts occurring during the process as well as faults/door opens which will delay the EGM from actioning the TI Ack Poll.*

- In support of cases where a ticket printer has failed or malfunctioned, the TITO system (via the gaming venue operator) must provide a facility that allows ticket transactions to be **manually redeemable** at a TITO operator terminal by an authorised person. Finding a

ticket in the TITO system must be possible via a manually entered AUTHNO, but must also be possible via other search methods such as for example using the EGM ID and ticket serial number (TSER)⁷. (In QCOM TITO, it will be typical for the attendant not to have the AUTHNO, as QCOM EGMs intentionally do not reveal this value except on a printed ticket.) In cases of manually redeeming a ticket where a ticket is not presented it is recommended details of the event be recorded (including the attendant's ID) depending on risk.

- The “^” character is a special case and systems must not use in a cash ticket string field.

TITO systems must never use the “^” character in the venue name, venue address or CTEXT fields printed on a cash ticket; otherwise the entire field (or parts thereof) may not be printed. Even though this character is included the QCOM list of supported printable characters, current ticket printers consider “^” to be a control code and will not print this character or possibly the whole message it is embedded in. Refer QCOM section 2.3.8 for the list of supported printable characters.

4.12.2. Communication Issues and TITO

Every TI or TO transaction in a TITO system is comprised of several stages. For example:

QCOM Cash Ticket Out EGM-SC Process Summary:

--->System receives Cash Ticket-Out Request Event
<---System sends TO Ack Poll
--->System Rx EGM DLL level acknowledgement to the TO Ack Poll (within 5msec of Ack Poll Rx)
--->Final Meter Confirmation⁸

QCOM Cash Ticket In EGM-SC Process Summary:

--->System receives a new “Ticket-In Request” unnumbered event. (NB the EGM GSR ‘TI’ bit flag will subsequently indicate a TI is pending)
<---System sends Cash Ticket-In Request Acknowledgement Poll
--->System Rx EGM DLL level acknowledgement to the TI Ack Poll (within 5msec of Ack Poll Rx)
--->Final Meter Confirmation⁹

Depending on the design of the TITO system there may also be several more internal stages, for example depending on how many discrete components there are in the overall TITO system, the arrangement there of and possible failure scenarios.

TITO system developers need to be mindful that at any stage there may be a loss of communications between the EGM and the system, or between discrete system components within the overall TITO system as well. The purpose of this section is to define a few high level requirements in regards to EGM-SC communications issues with respect to QCOM TITO and raise awareness.

⁷ In QCOM TO, when a ticket print fails, an attendant can retrieve all ticket details except for the AUTHNO via EGM audit mode; thus searches in the TITO database not based on AUTHNO will be common.

⁸ A timeout here could be based on either meter group response timeout, or the meters at the time the EGM indicates it has exited the TO lockup.

⁹ Suggest a 10 second timeout here. Make the timeout value is an easily adjustable parameter in the system.

The overall **requirement** is: there must be no scenario concerning interruptions (or in general) pertaining to any transaction in a TITO system where by a transaction or cash amount can be lost, duplicated, stolen, deleted before its time, or its state be incorrectly recorded. Lists of specific test cases are highly system dependent, potentially long and are outside the scope of this document, but they must all be thoroughly analysed and tested in every system.

Ticket Out

In QCOM a cash ticket out can still be instigated by a player while the EGM is off-line from the SC. If this occurs the EGM will still enter a Cash Ticket-Out Lockup and remain in the lockup until communications is restored at which time the SC can then either process or deny the request.

It is likely that a gaming venue operator will want the ability to instigate manual payments in the event of a significant delay in getting the EGM back on-line, which means that the TITO system should have a procedure to manage this operational need to the satisfaction of the gaming venue or operator. E.g. The TITO system should not automatically authorise or deny a TO if there has been significant delay since the start of the TO; the system should wait for manual advice.

The only **requirement** is that for whatever procedure is adopted, or options made available, there must be a negligible chance of the system causing a double payout scenario (e.g. the player receives a manual payment but then the EGM subsequently is ordered to produce a cash ticket for the credit redemption transaction), or a walk-away, or a belated payment to a vacant EGM or wrong player. Any deviation by an EGM from expected behaviour from the SC's/ systems point of view must be logged as events to help with diagnosis.

Ticket In

In QCOM, while a cash ticket-in transaction cannot be instigated by a player while the EGM is off-line from the SC, it is still possible for the boundary case to occur, where a cash ticket-in is instigated just prior to a loss in communications. If this occurs, the SC may not see the instigating Cash Ticket In event until after communications is restored, but in kind could also potentially receive it prior. In either case the system needs to take into consideration that the EGM will automatically timeout/cancel the transaction after 10 seconds.

It is recommended (to keep it simple) that the system defaults to trying to abort (i.e. let the time-out occur) in the event of any concerns or issues (the patron can always retry) but only so long as the system has not reached the stage where the SC has fired off the TI Ack Poll to the EGM. In this case it must hold the transaction in a specific state until it can ascertain as to whether the EGM received the poll and incremented its meters or not.

Any deviation by an EGM from expected behaviour from the SC's/ systems point of view must be logged as events to help with diagnosis.

4.13. SC EGM Response Error Checking

The SC must not assume any data received from the EGM is ever correct. All received data from the EGM / LAN must be subject to thorough integrity and reasonableness tests. Any invalid data detected from an EGM must result in an event with details in the monitoring system for diagnostic purposes.

There must be no sequence of invalid or corrupt data which, when received by a SC, could adversely affect the SC's integrity such as corrupting its RAM, or its ability to recover the instant corruption ceases.

The SC must be aware that any response from an EGM could be its last, thus the SC must be able to automatically recover from any state/procedure in regard to the EGM at any time.

All reserved response message bits and bytes must always be masked out by the SC during response message processing to avoid any backward compatibility problems when the protocol is expanded.

The SC must perform the following integrity checks on all received responses from an EGM:

4.13.1. Data Link Layer

(QPv1.6) SCs must use the response message's DLL->CTRL field to immediately identify what version of QCOM EGM it is talking to.

The SC must ignore any received parity or framing errors on received characters, the response message CRC is the validating methodology.

The SC must first validate that the response's address is correct, then obtain the message length, receive the entire response and validate the response CRC. Only then may the SC process any further response message data.

A SC must only NAK an EGM's last response if:

- the EGM did not respond to a poll (either entirely or partially).
- it is declared a non-response for any reason as defined in this document (such as a time-out or invalid poll address).
- the response had an invalid CRC.

A successful EGM response denotes an acknowledgement to the last poll from the SC.

If an EGM does not acknowledge a poll from the SC (see above), the SC must either: resend the same poll again on the next poll cycle along with a NAK (preferred), or the General Status Poll*. On the 3rd consecutive unsuccessful attempt (NAK), the EGM must be declared non-responsive and the unsuccessful poll message must be handled at a higher level (if this is required for that poll type), or simply resent again next session if and when appropriate.

(* This is because a QCOM v1.6 EGM will ignore the poll message data on polls that contain a NAK, as a v1.6 EGM is allowed to assume that they have previously processed any poll containing

a NAK. This helps eliminate the possibility of duplicate polls. NB: A QCOM v1.5 EGM will process every poll regardless of ACK or NAK.)

After an EGM has been declared non-responsive the SC must default to sending the General Status Poll until the EGM resumes responding again.

Also note that in QCOM v1.5, ACK/NAKs were applied to event responses even across two communication sessions. But in QPv1.6, if the last response in a session was an Event response, the EGM will assume a NAK and resend the event regardless. This means there will be the occasional duplicate event (however the SC must filter out consecutive duplicate events (this is a long standing requirement - refer 4.13.7,) and also, it means that the SC and EGM do not need to keep the CTRL ACK/NAK bits in NVRAM for QCOM v1.6 implementations.

4.13.1.1. Response Poll address

If the SC receives a response to a poll where the response's address did not match the poll's poll address, it must ignore the response and consider it a non-response for NAK'ing purposes.

4.13.1.2. Length Byte

See below

4.13.1.3. Control Byte

Mask out unused bits.

The SC must use the unnumbered broadcast negative acknowledgment bit to ensure the EGMs receives important global messages containing Site Details for venues using ticket printers.

QPV field (new to QPv1.6 but applies to all QCOM Protocol versions)

A QCOM v1.6 EGM will indicate its protocol version in bits 5&6 of this control field in every response (via the QPV field). A SC must use this information in every response to immediately determine what protocol version EGM it is talking to. If the version changes for a given EGM, the SC must log the "DLL Version Changed" event. If the version changed on the first response of a new session, then the SC must switch protocol versions accordingly and either continue or restart the session (whichever is easier). If the version changed mid-session (which would be not be typical behaviour) then the SC may treat this as an EGM configuration error and/or force a session restart, or simply hot-switch protocols mid session, whichever is easier for the SC. If an unknown or unsupported QPV field is received, then the SC should treat this as an invalid EGM configuration as per an invalid configuration in the EGM Configuration Response (4.13.5).

4.13.1.4. Response Message CRC

The SC must only process response message data and acknowledge responses which have a valid CRC. An invalid response message CRC is considered by the SC as a non-response.

4.13.1.5. Length Check

After validating a received message's CRC is correct and before processing any further message data, verify the message is at least the minimum possible size as indicated by the QCOM protocol document (i.e. large enough to hold a function code with a CRC appended).

Then verify that the actual length of a received message is greater than* or equal to the expected message length as indicated by the function code. (Note, where you have to access the message data to work out the expected length, ensure this it is also within the actual message body first)

If the actual length of a received message is less than expected, the SC must acknowledge the message, log an event, but ignore (i.e. do not process) the message data.

* SCs must be able to process a response with additional message data following the known message data but before the CRC (i.e. a response message must not be considered invalid because it has a length byte greater than what the protocol indicates). This allows the protocol to be extended by adding information to response messages for future expansion, while maintaining backward compatibility.

For future expansion and backward compatibility the largest response message all SCs must be able to process (from address byte to CRC inclusive) is 256 bytes.

4.13.1.6. Illegal or unknown EGM response function code

If the SC receives a valid response (i.e. correct CRC) with an unknown response function code, it must acknowledge the response but ignore the message data. This is to allow for backward compatibility.

4.13.2. Response Type Timeout Detection.

In general, after a SC receives an acknowledgement* to a poll requesting a specific response type from the EGM, the SC may expect to receive the required response in response to the next poll provided no higher priority response was pending. If not, the SC must assume a timeout on that response type.

*in QCOM a response denotes an acknowledgement

Regarding deadlock: A SC must not assume at any time that it will receive a response to any requested response type or action. (An EGM may stop responding at any time or it could have a bug.) The reason for this requirement is to avoid the SC getting stuck indefinitely waiting for a specific response or event. Whenever a SC requires a specific response from an EGM, implementation of the appropriate response timeout detection and recovery is mandatory to ensure the SC can always get out of any situation.

4.13.3. Common Field Formats

4.13.3.1. Game Version Numbers GVN and Variation VAR

The SC must verify all received EGM GVN and VAR fields are correct with respect to the configuration expected by the monitoring system. If an invalid GVN or VAR is received, the SC must report an invalid configuration event and immediately disable the EGM (via the EGM Machine Enable Flag) until the problem is addressed.

4.13.3.2. Serial Numbers and MID

The SC must verify all received EGM serial numbers and MID as BCD and ensure they are correct with respect to the messages poll address and expected monitoring system configuration. If an invalid serial number or manufacturer ID is received, the SC must report an invalid configuration event and immediately disable the EGM (via the EGM Machine Enable Flag) until the problem is addressed.

4.13.3.3. Poll Sequence Numbers

PSNs are used in poll messages only to avoid duplication on specific poll types. The SC must use this in accordance with the description in the OLGR EGM protocol document.

The SC must be able to detect if the EGM has a PSN out of sequence. (For Purge Polls, an out of sequence purge events poll PSN can be detected in QPv1.5 via an expected response timeout of the purge poll acknowledgement response after a Purge Poll has been sent to the EGM. For QPv1.6 EGMs, use the Purge Ack Response message data. For the cashless transfer PSN, in QPv1.5, detect a PSN timeout via an expected response timeout of the group meter response containing the 'cashless in' meter after an 'ECT to EGM' Poll has been sent to the EGM. For QPv1.6 EGMs use the ECT-to-EGM Poll Acknowledgement Response message data)

PSN Recovery Procedure:

If a SC detects any of the EGM's PSNs are out of sequence via the above methods, the SC must automatically recover by resetting the EGM's PSNs via the EGM Configuration Request poll and then re-queue the applicable poll. If the same problem occurs immediately again (i.e. twice in a row) do not keep retrying, but log the "Poll Sequence Number Fail" event and disable the EGM (log the 'EGM disabled by System' event). If an EGM fails to recover from using this procedure, then this indicates the EGM has a serious software bug or RAM corruption. In either case this event must be reported to OLGR before RAM clearing the EGM.

4.13.3.4. Progressive Group I.D. PGID

The SC must verify all received EGM PGIDs are correct with respect to the monitoring system configuration. If an invalid PGID is received from an EGM, the SC must report an invalid configuration event and immediately disable the EGM (via the EGM Machine Enable Flag) until the problem is addressed.

4.13.4. EGM Program Hash Response

- 4.13.4.1. The SC must ensure the reported hash is correct with respect to the hash supplied by OLGR. If an incorrect hash is received, an event must be logged and the EGM must be disabled until a correct hash is received. All incidences of invalid program hashes from EGMs must be investigated by the LMO as to the cause.
- 4.13.4.2. There must be no facility in the monitoring system or SC to override or disable program hash checking, enable an EGM which has not reported a program hash, or has reported an invalid program hash.
- 4.13.4.3. A 300 second program hash response time-out must be checked. (Note this parameter can be changed at any time, check with the OLGR for the latest

value.) If an EGM fails to respond to a Program Hash Request upon receiving the request poll within the timeout period, then a hash time-out event must be reported and the EGM disabled (via the EGM Machine Enable Flag) until a hash is received within the time-out parameter.

- 4.13.4.4. The hash time-out parameter must be an easily configurable parameter in the monitoring system, as it may be increased with little notice by OLGR. Systems should allow for time-out parameters of up to 65535 seconds. The hash time-out parameter must be stored for every EGM in the system as OLGR may require a special hash time-out parameter for a specific EGM or game.
- 4.13.4.5. If an unexpected program hash response is received by the SC, then the SC must log an event for information purposes, other than that, it must ignore the response.

In QPv1.6, program seeds & hashes are now 20 bytes long (was 8).

4.13.5. EGM Configuration Response

All information in this response (excluding the FLGA, FLGB, FLGS, NPRV*, LGVN, LVAR, NUMG and NUME fields) must be validated with the configuration the SC expects to receive from the EGM. Any incorrect information will cause the monitoring system to immediately log an invalid configuration event and disable the EGM (via the EGM Machine Enable Flag) until a valid configuration is received.

In QPv1.6 EGMs, NUMG may change after EGM configuration depending on what EGM parameters were set by the EGM Configuration Poll (4.7.2). Also refer 4.7.2 regarding verification of the new parameters in this response.

(*The DLL->CNTL->QPV field is the primary field the SC must use to detect what protocol version EGM it is talking to. However, the NPRV->QPV field in this response may optionally be validated by the SC as per the QPV field sent by the EGM in every response in the DLL. Refer 4.13.1.3)

The NUME field is used by the SC to determine the maximum number of games it may enable at one time on the EGM.

The LGVN field in this response is the same as the LGVN field in the Meter Group Contribution Response. The SC must store only one LGVN & LVAR field per game. If the received LGVN and LVAR were valid (exist, or they may be zero), these fields must be used to detect a change of last played GVN or VAR in the EGM. A detected change must trigger a Multi-Game/Variation Meter request to retrieve the last known multi-game/variation meters for the deselected GVN & VAR. If either the LGVN or LVAR fields are invalid or zero then they are simply ignored.

FLGS: Shared Progressive Component Flag (QPv1.6.2)

Refer QCOM for definition before reading further. This flag is only applicable to multi-game EGMs with one or more progressive game.

If the EGM's shared progressive flag is set, then for any response from an EGM containing progressive information for a game, the SC must treat the progressive data fields in the response as if it was from a response from each game in the EGM. I.e. the SC must copy/save the values against all other progressive games in the EGM. There are exceptions on some progressive fields,

specifically the PAMT (the LP Turnover meter) and the HITS and WINS meters; these fields must still be stored and treated on a per game basis (i.e. as if the Shared Progressive Component Flag = 0). Refer to the QCOM Protocol document: 'Shared Progressive Component Flag' for more information.

If the flag is set, then this also means that a SC only has to send one Progressive Configuration Poll to configure all the EGM's progressive games, or one EGM Game Configuration Change Poll to change the PGID for all progressive games in the EGM.

If not set, then this indicates the progressive component is mutually exclusive for all games in the EGM. No special action is required on behalf of the SC; it must treat each games progressive component as exclusive. (This was the default behaviour in QCOM v1.5.)

4.13.6. EGM Game Configuration Response

Required validation by a SC:

GVN	If the GVN is enabled (FLG:bit 7), then the GVN must be verified as approved for the jurisdiction and with respect to the configuration the SC expects to receive from the EGM. Disabled GVN's (games) which are not recognised (as approved) by the SC, must simply be ignored by the SC and must never be configured or enabled. (QPv1.6)
VAR	If non-zero then the VAR must be verified as approved for the jurisdiction. If zero then this indicates that the game requires configuration by the SC, refer 4.4.
FLG	Trusted. No validation required.
PNUM	If the GVN field above is validated, then this field must also be verified as correct with respect to the configuration the SC expects to receive from the EGM.
PLBM & PGID	If the game is configured (non-zero VAR field above) then this field must be verified as correct with respect to the configuration the SC expects to receive from the EGM. If the game is not configured (VAR = 0 above), then no validation is required.
NUM	Verify NUM >= 1 and NUM <= 16. (QPv1.6) If NUM is in range but > or < expected, then this is ok as the EGM may vary the number of games depending on the parameters set in the EGM Configuration Poll.
SIZ	Verify SIZ >= minimum expected size as indicated by QCOM and crosscheck SIZ against the messages total length (LEN) field in the DLL.
Variation List for the Game	
VAR	Unknown or unapproved VAR's must simply be ignored by the SC and must never be made the active variation. (QPv1.6)
PRET	No '=' or '!=' validation operations should be performed on this field (due to potential rounding issues). However, it is acceptable to use it for < or > validation operations. NB. This field has differing units and definition between QPv1.5 & QPv1.6. Refer QCOM for more information.

(Previous requirements for QPv1.5 validation, FYI only: All information in this response (excluding the FLG, PRET fields) must be validated with the configuration the SC expects to receive from the EGM. Any incorrect information will cause the monitoring system to immediately log an invalid configuration event and disable the EGM (via the EGM Machine Enable Flag) until a valid configuration is received. The NUM field must also be verified to be in the range 1...8 inclusive and

the SIZ field must be less than 17 and be used to determine the correct repeated entry size. If incorrect, the response must also be considered invalid as above.)

Note that a QPv1.6 EGM will not send this response if EGM configuration has not been successfully completed by the SC via the EGM Configuration Poll.

4.13.7. EGM Event Responses

The OLGR may create new EGM events at any time which must be supported by monitoring systems within three months of their release.

4.13.7.1. Resent or Duplicate Events

If a monitoring system uses numbered EGM events or event data for any purpose other than for reporting in the host computer, then the system must be able to handle the case where the same event is received twice as a result of a request all logged events poll or other reason. It is extremely important for some event types that the SC does not inadvertently process the same event twice. E.g. in the case of a LP Award event, it may cause the jackpot to be inadvertently reset. For this reason the LP Award Event has a special test (section 4.9.7). Because of the difficulty in perfectly filtering all duplicate numbered events, it is recommended that the SC should try not to use numbered EGM events for any purpose other than as an audit log.

Detected duplicate events may be discarded by the monitoring system (it is very resource intensive to check every event so this is not mandatory).

However, consecutive duplicate events from an EGM must be discarded by the SC before processing the event. (A duplicate event is identical in all respects, date and time sequence number, event code, etc.) Note, QCOM v1.6 EGMs will send a consecutive duplicate event if its last response of a session was an event response. It is expected that the SC must ignore the duplicate event in this case as per the above requirement regarding consecutive duplicate events.

4.13.7.2. Unnumbered Events

Events defined as unnumbered events may be discarded by the SC or monitoring system if desired. However, if a system normally discards un-numbered events, the host system must have the ability on demand for debugging purposes, to be able to switch on long term storage and reporting of un-numbered events in the SC and CMS as per numbered events.

By default the CMS must not include events defined as unnumbered events (refer QCOM protocol) in event reports for OLGR, unless they are specifically flagged for inclusion. All other defined events must be passed to the monitoring system and stored in a fault tolerant manner.

4.13.7.3. Event Sequence Numbers

If the SC receives an unexpected (or out of sequence) sequence number on a received numbered EGM event (i.e. an event with SEQ != 0), the SC shall log the event: "SC-EGM Unexp. EGM Event SEQ No.". The first time only that this event occurs in a session the SC must also queue a Request All Logged Events poll.

If any further event sequence mismatches occurs again in the same session, the SC must always log the event sequence mismatch event, but do not queue another request all logged events poll. Even if the problem occurs again in the same session, do not queue a request events until the next session and another sequence mismatch occurs.

To avoid repeatedly logging out of sequence event events, SCs must always reset its next expected EGM event sequence number off every received numbered event, regardless of whether it was in sequence or not.

Event sequence number checking should not be performed on consecutive duplicate events (they should just be discarded), or on the first event received from an EGM after a SC RAM clear, or on the first received event **after** a request events poll (NB. An event in response to a request all logged events poll is not the first event in the event queue, refer section 4.7.12 on Request Events Poll), or on events received with a sequence number of zero, or if the event is the (0x002A) "EGM NV-RAM cleared" event.

The Event Sequence Number the EGM sends on its events must be carried through and displayed on any event reports for OLGR in the required format. It must not be discarded or substituted by the monitoring system. SCs must maintain its own event sequence number for events which it logs.

Note, it is not unusual to get a duplicate event from an EGM on an EGM power up if its last response was an event response. This event must be considered as consecutive duplicate event and discarded by the SC. The SC must not consider it an event sequence mismatch.

4.13.7.4. EGM Date Time Stamp Checking

The SC must perform the following checks on all date and time stamps received from the gaming machine:

- Each field is BCD and within valid ranges for that field.
- It is not greater than the current date and time plus five seconds.
- It is not older than 1 month from the current date and time.

If an EGM date and time stamp fails any of the above checks the SC must change the invalid EGM event date and time stamp to the SC current date and time and log an invalid date and time stamp event for the EGM. Do not disable the EGM.

4.13.7.5. Unknown EGM event code

If the SC receives an unknown event code from an EGM, so long as it is within the range 0x0000-0x7FFF, it shall store the event as normal (including any extended event data). Any event report containing 'unknown' events must display the event as "Reserved" with its event code and any extended data displayed in hex.

If the event code is not in the above range the SC must ignore the EGM event and log an 'Invalid EGM Event' event (refer 4.14.1.6). Do not disable the EGM in either case.

Note if the SC ignores an event, it must not forget to update the next expected event sequence number regardless.

Unused event codes in the range 0x000-0x7FFF are reserved for future expansion. Event codes greater than 0x7FFF are reserved for monitoring system use.

4.13.7.6. Extended event data size

If the extended event length (ESIZ) field is greater than 16 bytes in length, the SC must ignore the event and log an 'SC-EGM Invalid Event' event. However new monitoring systems must be able to *efficiently* support extended events of up to 5k bytes in size for future expansion.

If the extended event length field (ESIZ) is incorrect with respect to the expected size for the event function code as defined in QCOM, then the SC must ignore the event and log an ' SC-EGM Invalid Event' event for the EGM (refer 4.14.1.6).

Note if the SC ignores an event, it must still update its next expected event sequence number regardless.

4.13.7.7. Excessive Events

A SC must log an event if an EGM logs too many events in a time period. Refer event 4.14.1.7

All monitoring system methodologies for dealing with excessive events from any device on it (E.g. EGM or SC), other than save-all, must be submitted and approved by the OLGR. As a part of a submission in this regard, include a table of when/why the monitoring system purges events.

4.13.8. Purge Event Poll Acknowledgment

SCs must use this response to detect an out of sequence PSN number on a Purge Event Poll message. Refer section 4.13.3.3 on PSN handling for the correct procedure.

In QPv1.6 EGMs, this response is always queued in response to a Purge Poll and now contains the purge poll PSN for easier tracking of the Purge Poll PSN.

In QPv1.5 EGMs, this response was only queued in response to a Purge Poll if its PSN was correct.

4.13.9. Meter Group/Contribution Responses

The SC must verify the following items before processing the data in this response:

- Crosscheck FLG mask bits 0...2 against response length re the number of meters in the response
- LGVN is valid for the EGM (refer to EGM Configuration response on how to process LGVN)
- For each meter verify MGID is reasonable e.g. $\leq 0x24$ or max ID as supported by the system
- If the progressive component exists then verify PGID is valid for the LGVN and is as set by the system

The SC must ignore the response if any invalid data is received.

The SC must apply the reasonableness test to each meter as per section 4.13.9.2.

If the SC receives a reserved group meter ID and meter, the SC must either simply ignore the reserved meter, or just accept and store the meter with no increment checking.

NOTE. OLGR may define new group meters or add meters groups at any time which must be supported by the monitoring system within three months from publication in non-draft versions QCOM.

MET fields are processed as per section 4.13.9

The PAMT field is processed as per section 4.13.10

4.13.9.1. Meter Storage

The monitoring system must maintain a current EGM meter group set at all times. An EGM meter group set is currently defined as meters **since last EGM RAM clear** (gross meters), comprising of meter groups 0-2 and multi-game meters (Refer OLGR EGM Protocol document). EGM meter group sets must always have a date and time stamp identifying how recent they are in the system.

SCs must operate primarily with gross meter values, i.e. total values since last EGM RAM clear. The SC must send gross meter sets to the central computer which must be used as the primary values for basic monitoring and the calculation of period meters. SCs which try to work primarily in net or period meters for basic monitoring will not be approved. (SCs which use period meters lose metering information if a SC crashes or is RAM cleared. Gross meters do not suffer from this problem).

The monitoring system must be ready to permanently store an EGM meter group set whenever an EGM stops responding. The monitoring system must permanently store the last received EGM meter group set under the following conditions:

- an EGM RAM clear is detected.
- at the end of every accounting period which must be at least once per day.
- on demand via a command sent by a monitoring system operator personnel at the host computer.
- upon EGM commissioning for the first received EGM meters.
- upon an EGM decommissioning.

If a SC's meter log becomes full the SC must disable the site until such time as space becomes available.

The SC must not purge any meter sets from its NV-RAM until the meter sets to be purged have been sent and acknowledged to be stored fault tolerantly by the central computer.

4.13.9.2. EGM Meter Increment Reasonableness Tests

The SC must perform reasonable increment tests on all received EGM meters. **Maximum reasonable increment limit amounts are shown below and pertain to a QLD Clubs and Hotel QCOM LAN with a 1 sec poll cycle and a 10 second poll cycle time-out.** (A different set of

sanity values should be used for example for SC-host communications and should be set relative to the connection frequency and time-outs involved)

Casinos and other gaming environments should also adjust the thresholds listed below to suit their individual operating environments.

An unreasonable meter increment must cause the “Unreasonable meter incr.” event to be logged and the SC must disable the EGM until the problem is investigated by a qualified and authorised LMO employee and the EGM is deemed fit to be returned to play.

When testing for unreasonable increments, the SC must always use the last received meter value for future tests regardless of whether the last received meter was reasonable or not. Otherwise after the first unreasonable increment, the SC would see all future increments as unreasonable as well.

The only time when a reasonableness test must not be performed is on the first meters received from an EGM by the SC and after either a SC RAM clear or EGM RAM clear. I.e. an EGM or SC RAM clear must not cause unreasonable meter increment events.

Reasonable meter increment tests must handle meter rollover and an unreasonable meter increment event must not be logged in this case either.

All detected invalid meter increments must be **automatically** excluded by the monitoring system when performing any net meter calculations. If an incidence of an unreasonable meter increment was subsequently found to be valid, then a manual adjustment must be able to be performed at this time by an authorised person via a facility in the host computer of the monitoring system.

All the valid increment threshold amounts must be easy to change parameters in the monitoring system and can be only increased with the permission of the OLGR unless stated otherwise. Limits may be lowered at the operator’s discretion. A set of these reasonable increment values must be stored for each EGM in the monitoring system. OLGR may require specific limits to be set for a particular EGM.

All incidences of unreasonable meter increments must be investigated by the LMO. Every incidence must be signed off by an authorised person. Failure to diagnose the reason for any unreasonable meter increment must be referred to the OLGR.

Group 0 Meters

ID	Description	Valid Increment Threshold (QLD Clubs & Hotels)	Comment
0x00	Total EGM Stroke	30	
0x01	Total EGM Turnover	\$100	
0x02	Total EGM Wins to credit meter	\$40,000	Typical. May be set higher as required to handle an approved game’s Maximum Non-Progressive Win. Use the formula MAX_NPWIN + \$1,000
0x03	Total EGM Cancel credit	\$40,000	As above.
0x04	Total EGM Ticket Printer out	Only reasonable when expected**	
0x05	Total EGM Cents In	\$500	This value may be temporarily

			adjusted upwards by the SC for the duration of the last cashless transfer if the transfer was greater than this limit.
0x06	Total EGM Cents Out	\$500	As above.
0x07	Total EGM HPSAP wins	\$26,000	This value may be set higher as required to handle an approved game's Maximum Progressive Win. Use the formula MAX_PWIN + \$1,000. As this meter is only sent by IGT protocol EGMs, the threshold may be set to \$0 for QCOM Protocol EGMs.
0x08	Total EGM LP wins	Only reasonable when expected*	Only reasonable when expected*
0x09	Total EGM Cash Ticket In	Only reasonable when expected**	QPv1.6.
0x0A	Total PID Accessed	30	(QPv1.6)
0x0B	Total Games Won	30	(QPv1.6)
0x0C	Total EGM SAP wins	\$26,000	(QPv1.6.1) This value may be set higher as required to handle an approved game's Maximum Progressive Win. Use the formula MAX_PWIN + \$1,000
0x0D ... 0x0F	Reserved for future expansion		

*Special case: Strict LP Win Meter movement reconciliation is mandatory. I.e. Every movement in the LP Wins meter must be reconciled by the SC against all prize amounts received in valid LP Award events. In addition, a failure of the LP wins meter to change when expected (i.e. after LP Award Lockups) must also be detected by the SC and be treated as an unreasonable meter movement in the negative direction. The intent behind strict LP Win Meter movement reconciliation is security.

E.g. a LP award event of \$60,000 was received and authenticated by the SC, the lockup is acknowledged by the SC (via the LP Ack. Poll) and the LP lockup is subsequently cleared. If the next time the SC receives the LP wins meter (via the Meter Group Response upon LP lockup exit) the SC must ensure that the LP wins meter reflects the LP win of \$60,000, if not, this must result in an unreasonable meter increment of -\$60,000 and disable the EGM. Similarly, if the LP wins meter incremented by \$0.01 or more at any other time, then this must result in an unreasonable meter increment of \$0.01 and disable the EGM.

Implementation notes regarding strict LP Win Meter movement reconciliation. Because the LP Win Meter is not incremented by an EGM until after a LP Award Lockup is cleared, the following methodology may be worth consideration:

1. The SC/CMS should set the default value for the unreasonable meter increment threshold for the LP wins meter to zero.
2. Upon the SC successfully validating a new LP Award Event, the SC **incrementally adds** the amount in the LP Award event to the unreasonable meter increment

threshold for the LP wins meter and also increments the win amount to a special NV Variable for the EGM called 'ExpectedFinal[LP_WINS_METER]'.

I.e. ReasonableIncThreshold[LP_WINS_METER] +=
LP Award Amount from LP Award event;

ExpectedFinal[LP_WINS_METER] += LP Award Amount from LP Award event;

3. Then for QPv1.5 EGMs, upon the next detected return to idle mode¹⁰ (as indicated by the General Status Response) and the LP unreasonable meter increment threshold is not equal to zero, the SC resets the unreasonable meter increment threshold for the LP wins meter back to zero and verifies that its current value of the LP wins meter is now equal to the previously saved expected final value.

I.e. In simplified C notation, upon next detected return to idle mode:

```
if (ReasonableIncThreshold[LP_WINS] != 0) {  
    ReasonableIncThreshold[LP_WINS] = 0;  
    if (CurrentValue[[LP_WINS] != ExpectedFinal[LP_WINS_METER]) {  
        Log the Unreasonable Meter Increment Event for the LP Wins Meter  
        with the unreasonable increment value field in the event set equal to:  
        (CurrentValue[LP_WINS] – ExpectedFinal[LP_WINS_METER]);  
        Set ExpectedFinal[LP_WINS_METER] = CurrentValue[[LP_WINS];  
    }  
}
```

For QPv1.6.x EGMs, the above function can also be applied upon every detected exit of a LP Award Lockup (as indicated by the General Status Response) for stricter monitoring of LP Wins meter movements.

4. Finally, to avoid unwanted unreasonable meter increment events for the LP Wins Meter being logged, the ExpectedFinal[LP_WINS_METER] NV variable should be reset to the value of CurrentValue[[LP_WINS] meter upon the first receipt by the SC of the LP_WINS meter for a given EGM and upon EGM RAM clear detected procedures.

By keeping the unreasonable meter increment threshold for the LP wins meter at zero for most of the time will allow the SC to detect any unexpected movements in the LP Wins meter and checking the final expected value will detect a LP wins meter that also fails to increment at all when expected.

There may be other acceptable methods for strict LP wins meter reconciliation worth considering. However, keep in mind that the SC has to handle the LP games in which multiple LP awards may

¹⁰ Don't try using 'exit of LP lockup' as a trigger here for QCOM v1.5.5 EGMs, as there is a known issue with a QCOM v1.5.5 brand of EGM in signalling an exit to a LP lockup via the GSR response. 'Exit of LP lockup' will work fine for QCOM v1.6.x EGMs.

be triggered during a free game series or feature, and also the possibility of two LP awards on consecutive plays with no Idle Mode STATE received (via the GSR) in between.

Group 1 Meters

ID	Description	Valid Increment Threshold (QLD Clubs & Hotels)	Comment
0x10	Total EGM Hopper Refills	\$1000	
0x11	Total EGM Coins/Tokens in	\$100	
0x12	Total EGM Coins/Tokens out	\$500	
0x13	Total EGM Coins to Cash box	\$100	
0x14	Total EGM cashless credit in	Only reasonable when expected**	
0x15	Total EGM cashless credit out	Only reasonable when expected**	
0x16	Total EGM Note acceptor in	\$500	
0x17	Total EGM Notes in	5	
0x18	Total Residual Crdt Rem. Turn.	\$10	
0x19	Total Residual Crdt Rem. Wins	\$10	
0x1A	Total Rejected Enabled Notes	5 (QPv1.6)	
0x1B	Total EGM Gamble Turnover	\$5,100 (QPv1.6)	Typically set at just greater than half of the Gamble wins threshold.
0x1C	Total EGM Gamble Wins	\$11,000 (QPv1.6)	Inherently linked to the QCOM Parameter Poll "DULIMIT" field and should be adjusted accordingly if this limit is changed
0x1D	Total EGM Coins/Tokens Cleared	\$50,000	
0x1E	Total EGM Notes Cleared	\$100,000	
0x1F	Reserved for future expansion.		

**Special case: a cent for cent reconciliation check must be performed with what the SC expects for any movement in these meters. E.g., if the SC saw the cashless in meter increment by 1 cent, but the SC did not previously send an ECT to EGM poll with this amount in it, then this would be an invalid meter increment for this meter. Similarly if the SC saw a 1 cent increment in the cashless out meter but never saw the 'ECT from EGM' event or 'ECT lockup' condition, then this would also be considered an invalid meter increment for this meter. If no cashless or TITO is implemented in the SC, then these values must be set at zero.

Group 2 Meters

ID	Description	Valid Increment Threshold (QLD Clubs & Hotels)	Comment
0xXX	Total EGM \$x Notes in (count)	5	

Notes for Meter Group ID Time-out Detection

Sometimes a SC needs to detect a timeout of a specific group meter that is expected. For example, group meter timeout detection is required when performing an ECT-to-EGM in QPv1.5.

In detecting a group meter timeout, the SC also has to handle the fact the EGM will send the lowest meter group ID first and that this fact combined with many pending meters, may delay the SC getting the required meter ID for a few extra poll cycles,

To implement group meter timeouts, a “meter expected flag” will be required for each group meter and the timeout routine will require two levels; a timeout of the Meter Group/Contribution Response and a timeout of getting the expected group meters within the meter responses.

In addition, timeout detection of a specific group meter ID cannot be done until the SC is sure that the meter is applicable to the EGM (i.e. it is being sent). For most group meters, applicability is indicated via the FLG in the EGM configuration response, however for some meters, applicability cannot be assumed until the SC has received the meter at least once before for that EGM since the last EGM RAM clear. Only then can the SC expect to receive that meter again every time it asks for its group, up until the EGM is next RAM cleared.

4.13.10. EGM Linked Progressive Contribution Meter Reasonableness Test

The LP Contribution meter is received in two response types, the Meter Group/Contribution response and the Progressive meters response.

An EGM has one LP Contribution meter per LP game. A SC is required to store one LP contribution meter per LP game per EGM to correctly implement QCOM LP.

The SC must validate the PGID and GVN and put a reasonableness test on the contribution amount equivalent to the turnover meter*. If a problem is detected, the SC must ignore the contribution, disable the EGM and log an “EGM LP Group Contr. Fail” event.

The SC must always use the last received LP contribution meter value for future tests regardless of whether the meter was reasonable or not.

However, if the SC has not received a LP contribution from an EGM before (e.g. After a SC RAM clear or EGM RAM clear) then the first contribution from an EGM will probably appear unreasonable. The SC must ignore the contribution and use the current meter value for calculating future contributions as normal, but it must not log the event or disable the EGM in this case.

*An unreasonable progressive contribution meter increment is a movement greater than the Total EGM Turnover meter reasonable increment as listed previously.

If the contribution is reasonable, the SC takes the calculated increment and adds it to the total level contribution meter.

4.13.11. Multi-Game/Variation Meters Response

The SC must verify the following items before processing the data in this response:

- GVN is valid for the EGM
- VAR is valid for the GVN

The SC must ignore the response if any invalid data is received.

The SC must apply reasonableness tests as per the equivalent group meter but with consideration that these meters are only asked for every \$100 of turnover. Suggest using a multiplier of 1000 for the stroke & 'games won' reasonable meter increments and a multiple of two for the remaining meters.

Note: to save NVRAM space, a SC only needs to store one set of multi-game/variation meters per game per EGM, provided it stores the last game variation meters at the central monitoring computer before hot-switching to a new variation and allowing it to play. Otherwise the SC will have to store a meter set per game variation.

Meters in this response must be stored in the host CMS at least once per day. Meters must be identified by EGM MID, SERIAL, GVN & VAR plus a date and time stamp.

Note, a QPv1.6 EGM can now only queue one response of this type at any time.

FYI: To allow closer tracking of multi-game/variation meters, it is possible for the SC to predict increments for these meters based on information received in the meter/group contribution responses. As these meters are normally only requested every \$100 of turnover, SC prediction of these meter increments allows exact tracking of the Multi-game/Variation Meter values at all times. The only trick is to be sure to deduct increments in the RCRF Turnover and RCRF wins meters from the corresponding multi-game/variation turnover and wins meters respectively as they are not added to these meters by the EGM.

4.13.12. Bet Meters Response

The SC must request this response for all enabled games in the EGM at least once per day and every time the EGM resumes responding. Current totals must be sent to the host computer once per day. The CMS host computer must maintain totalised bet meters in the system on a per game basis across the entire network; each record must be identified with a MID & GVN & game denomination.

Verify GBFA & GBFB is in correct ranges before processing the response message data.

Verify SIZ >= minimum expected size as indicated by QCOM and crosscheck SIZ against the messages total length (LEN) field in the DLL before processing the response message data otherwise the response message data must not be processed.

The GVN in the response must be valid for the EGM and the EGM's serial number must have been validated previously in the session, otherwise the response must be ignored by the SC.

Note that bet meters will be reset to zero by the EGM upon a denomination hot-switch as well as possibly changing the total number of meters reported by the EGM in the response. Accordingly, the CMS must start new bet meters records for the EGM's games upon a denomination hot-switch.

There is the possibility that the number of meters in this response for a game may change shortly after Game configuration, as in some brands of EGMs, it takes a few seconds to work out how many meters are to be reported in the response. In that time period, the EGM will report a zero number of meters.

4.13.13. Player Choice Meters Response

The SC must request this response for all enabled games in the EGM at least once per day and every time the EGM resumes responding. Current totals must also be sent to the host computer once per day. The CMS host computer must maintain totalised PC meters in the system on a per game basis across the entire network; each record must be identified with a MID & GVN.

Verify NUM is in correct range before processing the response message data.

Verify SIZ \geq minimum expected size as indicated by QCOM and crosscheck SIZ against the messages total length (LEN) field in the DLL before processing the response message data otherwise the response message data must not be processed.

The GVN in the response must be valid for the EGM and the EGM's serial number must have been validated previously in the session, otherwise the response must be ignored by the SC.

There is the possibility that the number of meters in this response for a game may change shortly after Game configuration, as in some brands of EGMs, it takes a few seconds to work out how many meters are to be reported in the response. In that time period, the EGM will report a zero number of meters.

4.13.14. Progressive Configuration Response

Verify NUM is correct before processing the response message data.

Verify SIZ \geq minimum expected size as indicated by QCOM and crosscheck SIZ against the messages total length (LEN) field in the DLL before processing the response message data otherwise the response message data must not be processed.

QPv1.6 The SC must verify (by requesting this response for each enabled progressive game), at the beginning of each session or whenever the details have changed, that the information received in this response is correct. I.e. LP level parameters must agree with what the SC expects. For SAP levels, if the SC is not sure what SAP parameters should be set at (i.e. it did not customise them), then it is sufficient to validate them against the same validation checks the EGM performs on SAP levels as listed in the Progressive Configuration Poll in the QCOM protocol document. 'CEILING' must also be verified to be \leq \$60,000 (make this a globally configurable parameter in the CMS ($=$ MAXPWIN)). The "Invalid Progressive Configuration" event must be logged by the SC and the EGM disabled if a problem is found. The EGM must remain disabled until the EGM's progressive configuration is corrected.

A SC may change a game's current progressive configuration via the Progressive Configuration Poll (see 4.7.7) to another approved set of Progressive parameters for the game. This is considered equivalent to a variation change and any configuration changes must be done in accordance with other regulatory requirements on changing an EGM's RTP (e.g. no more often than once a month. Other regulation may also apply).

4.13.15. Progressive Meters Response

The SC must store one progressive meter set per progressive game per EGM. The meters: CAMT, HITS^{QPV1.6}, & WINS^{QPV1.6} (exclude the HRATE^{QPV1.6} field) must be sent and stored in the host CMS at least once per day.

The SC must verify the following items before processing the data in this response:

- GVN is valid for the EGM

- PGID is valid for the GVN as set by the system

- NUM is in the range 0...8

- Verify SIZ >= minimum expected size as indicated by QCOM and crosscheck SIZ against the messages total length (LEN) field in the DLL.

- For each level:

 - Level ID is in the range 0...7 and is valid for the GVN

 - The level type (LP or SAP) is correct as set by the system.

The SC must ignore the response if any invalid data is received.

The SC must provide a backup to an EGM's current SAP progressive amounts using the corresponding CAMT fields in this response. If a SAP EGM is RAM cleared, the SC must automatically reset an EGM's SAP amounts to the last saved CAMT amounts. Refer to the EGM Game Configuration Poll for more information.

If a progressive level is a SAP, a sanity check on corresponding CAMT meter movements is recommended, but is not currently mandatory at this time. If a CAMT sanity check is implemented, the SC should simply use sanity threshold delta of \$500. (Make this default easily adjustable per EGM in the system). Do reconcile CAMT with the % increment and Turnover meter increments as future SAP games may not necessarily utilise the vanilla progressive formulas. If any invalid movements are detected then follow the procedure as per any invalid meter movement (refer section 4.13.9.2) and log a new event type similar to 4.14.1.21.

If the game is a LP, then the SC must also process the LP contribution meter in this response (PAMT) to avoid missing an initial contribution if the SC is RAM cleared. Refer section 4.7.11. The reasonable test must be applied to PAMT as per section 4.13.10

LP progressive meters from this response may be used by the SC/monitoring system to automatically recover last known LP current amounts after a SC RAM clear. However, special coding would be required to ensure the SC does not broadcast new LP current amounts before it recovered the old amounts, then it would have to work out which were most current to use. Therefore it is recommended for simplicity, that recovery of LP current amount due to a loss or reset of a SC, be via a manual procedure via a meter read off the EGM's audit mode display.

(SCP v1.6.6) SC and systems must (asap) no longer using HRATE for any purpose.

The former requirement here for the SC to use HRATE to ensure a games total RTP was within MINRTP and MAXRTP (removed SCP v1.6.6) was not feasible moving forward as the formula to turn HRATE into an RTP will change from game to game in the future. As QCOM already requires the EGM to ensure each of its games' total RTP is within MINRTP / MAXRTP, the SC does not need to also worry about it.

Now if a SC/system does wish to work out the RTP of a progressive game (i.e. without using HRATE), one option is the progressive RTP field from “EGM Progressive Configuration Changed” events (0x2053), SC/systems can add this RTP to the applicable PRET field from the applicable Game Configuration Response to get the progressive game’s total RTP. (NB. However this event is only logged when the system actually makes a change via the Progressive Configuration Poll).

If the EGM’s shared progressive flag is set, then CAMT fields in this response must be treated as a CAMT response for every other progressive game in the EGM.

Note that a QCOM v1.6 EGM can now only queue one response of this type at a time.

4.13.16. CRanE Response

The SC must verify the data in this response with its expected CRanE configuration for the EGM. Any incorrect data will result in the EGM being immediately re-configured via the CRanE Configuration Poll.

If the SC detected an incorrect CRanE Response from an EGM that and the SC was also actively using any CRanE’s, then the SC must also disable the EGM and log event/s detailing exactly what the invalid fields were including any missing or extra entries. The EGM must remain disabled until manually re-enabled from the host system.

Verify NUM is within correct ranges before processing the response message data.

Verify SIZ >= minimum expected size as indicated by QCOM and crosscheck SIZ against the messages total length (LEN) field in the DLL before processing the response message data otherwise the response message data must not be processed.

4.13.17. CRanE Hit Event

The SC must verify that the event if applicable and that the level and hit rate of the event is correct. Any detected invalid CRanE Hit Event, the SC must log an event and not acknowledge the lockup until manual intervention/verification from the host system.

While the CRanE Hit event is defined as an unnumbered event and therefore by default may be discarded by the monitoring system, in the case where CRanE is being used for a regulatory jackpot then the CRanE Hit event storage must be treated by Monitoring System the as per ‘numbered’ events storage and volatility.

4.13.18. Note Acceptor Status Response

This response is only applicable to QPv1.6 EGMs with NAs. This response must be requested by the SC once at the beginning of every communications session with the EGM. The host CMS computer must be kept up to date with the current Note Acceptor Status Response information at least once per day. Only the current state and any changes (on an EGM basis) are required to be stored by the CMS. The change history data must be available in the CMS for at least one year after which it must be archived.

Validity Checks:

NADS: verify that (NADS[39] == 0) i.e. NADS is NULL terminated.

On fail, then the SC must not process or store the NADS field.

The SC must verify that the **defined** bits in the 'NAFLG' field agree with expected. Upon a mismatch the SC must queue a NA maintenance Poll with the expected NAFLG. The SC must not deadlock or disable the EGM if an EGM does not accept a NA Maintenance Poll's NAFLG.

The CMS must be able to produce a report on demand on the current NA make/model/versions for all EGMs with Note Acceptors. E.g. each entry in the report would contain at least the following information:

<VENUE NAME> <VENUE ID> <EGM MID><EGM SERIAL> <NADS field from NA Status Response>

4.13.19. General Status Response

The SC may use this information at its discretion.

4.14. Site Controller Generated Events

OLGR reserves all event codes from 0x0000 to 0x7fff for future expansion; monitoring systems may use all other event codes at their discretion.

OLGR may specify new SC or monitoring system events periodically, which must be supported by the SCs and monitoring systems within six months of their release.

4.14.1. SC Generated Events Concerning EGMs

The following events must be generated by the SC on behalf of the EGMs with the current date and time. Event codes may be assigned at the operator's discretion.

The following text appearing in quotes is the text which must be used in event reports for OLGR. *Italic text within the quotes must be replaced with the appropriate data.*

Where indicated, all variable extended event fields must be displayed on all systems and reports as specified.

4.14.1.1. "SC-EGM Stopped Responding"

Logged upon first three consecutive failed (i.e. NAK'd) EGM poll responses.

4.14.1.2. "SC-EGM Resumed Responding"

Logged on the first successful EGM response received after a non-responsive period as denoted by the previous event.

4.14.1.3. "SC-EGM Not Responding for 3 Days"

Logged when an EGM has responded at least once before but has since not responded for 3 or more consecutive days. Only report this event once per consecutive period of non-response.

4.14.1.4. "SC-EGM QSIM in Use"

This event must be logged by the SC whenever the SC receives an event from the EGM with the event code 0x2003. This SC generated event must be highlighted in the monitoring system as a critical event (but the EGM should not be disabled).

4.14.1.5. "SC-EGM Invalid Date and Time dd/mm/yy hh:mm:ss"

An EGM event was received with an invalid date and time (4.13.7.4). The EGM event with the invalid date and time must have its time stamp replaced with the SC's current date and time. The end result is the date and time of this event will be the same as the substituted date and time on the EGM event.

Extended Event Data: <TIME><DATE>

The invalid date and time stamp taken from the original EGM event

*TIME Seconds, Minutes, Hours, 1 byte each, in hex (BCD).
Display a 2 character hex number
The invalid time from the original EGM event*

*DATE Day, Month, Year, 1 byte each, in hex (BCD).
Display a 2 character hex number
The invalid date from the original EGM event*

4.14.1.6. "SC-EGM Invalid Event - EC:<ECODE> SIZ:<ESIZ>"

An EGM event was received which has either an invalid event code (i.e. > 0x8000) or extended event data size. Refer sections 4.13.7.5 & 4.13.7.6.

Extended Event Data: <ECODE><ESIZ>

ECODE Event Code. 4 bytes hex. The event code of the offending event.
*Display as 4 characters of unsigned hex, zero padded, **LSB** First.*

ESIZ Size of Ext Data on event. Decimal number.

4.14.1.7. "SC-EGM Excessive Events"

The SC received more than 300 EGM events from this EGM in any ten minute period*.

** This threshold was chosen to allow for a Request All Logged Events poll (4.7.12) on an EGM with a full event queue to occur without generating this event as a result.*

There may be more suitable methods to implement an event of this type with respect to a particular monitoring system arrangement. If an alternative method is utilised then please seek approval first. It is recommended any method used be parameterised in the system to allow for easy adjustment

Also refer 4.13.7.7 for more on excessive event handling.

4.14.1.8. "SC-EGM Invalid Program Hash – PSA32 Seed: 0x<SEED> Hash: 0x<HASH>"

The SC received a program hash from a QCOM v1.5.x EGM which did not match the hash the SC was expecting for that EGM.

Extended Event Data: <SEED><HASH>

*SEED Program Hash Seed, 4 bytes hex, display as 8 characters of unsigned hex, zero padded, **MSB** first.*

*HASH Invalid EGM Program Hash, 4 bytes hex, display as 8 characters of unsigned hex, zero padded, **MSB** first.*

4.14.1.9. "SC-EGM Invalid Program Hash – SHA1 Seed: <SEED> Hash: <HASH>"

The SC received a program hash from a QPv1.6+ EGM which did not match the hash the SC was expecting for that EGM. (A separate event for QPv1.6 EGMs was necessary because seeds and hashes in QPv1.5.x and QPv1.6+ are displayed in opposite byte order on the EGMs and in QCOM.)

Extended Event Data: <SEED><HASH>

*SEED Program Hash Seed, 20 bytes hex, display as 40 characters of unsigned hex, zero padded, **LSB** First.*

*HASH Invalid EGM Program Hash, 20 bytes hex, zero padded if necessary, display as 40 characters of unsigned hex, zero padded, **LSB** first.*

4.14.1.10. "SC-EGM Unexpected Program Hash – SHA1 Seed: <SEED> Hash: <HASH>"

The SC received an unexpected program hash from a QPv1.6+ EGM. (A similar event must also be generated for the PSA32 hashing algorithm)

Extended Event Data: <SEED><HASH>

*SEED Program Hash Seed, 20 bytes hex, display as 40 characters of unsigned hex, zero padded, **LSB** First.*

*HASH Invalid EGM Program Hash, 20 bytes hex, zero padded if necessary, display as 40 characters of unsigned hex, zero padded, **LSB** first.*

4.14.1.11. "SC-EGM Program Hash OK"

This event must be logged by the SC whenever an EGM returns a correct program hash after any invalid program hash was detected from that EGM. Logging this even upon any successful hash result is acceptable but not mandatory.

4.14.1.12. "SC-EGM RAM clear detected"

Logged whenever the SC detects an EGM has been RAM cleared. This must trigger a meter snapshot in the SC. Refer EGM RAM Reset Initialisation procedures on how to detect this.

4.14.1.13. "SC-EGM Meter Snapshot"

Logged the SC whenever it does an EGM meter snapshot. Refer Section 4.13.9

4.14.1.14. "SC-EGM Prog. Hash Time-Out"

The EGM did not return a requested program hash within the time-out period.

4.14.1.15. "SC-EGM Event Purge Ack Response Time-Out"

The SC did not receive a Purge Event Poll Ack response from the EGM in response to a purge event poll. The SC must allow sufficient time for the EGM to respond w.r.t. higher priority responses before logging this event (refer 4.13.8).

4.14.1.16. "SC-EGM ECT to EGM - Jackpot Payment \$<AMT> [<OTHER>]"

Logged by the SC whenever it attempts an ECT to the EGM.

Extended Event Data: <AMT>[<OTHER>]

AMT Amount of transfer in cents, 4 bytes hex, display in \$.¢

OTHER Any other information pertinent to the payment not already recorded may be added to this event type at the discretion of the monitoring system. E.g. PGID, Level details.

4.14.1.17. "SC-EGM ECT to EGM - Player Account \$<AMT> [OTHER]"

Logged by the SC whenever it attempts an ECT to the EGM from a players account.

Extended Event Data: <AMT>[<OTHER>]

AMT Amount of transfer in cents, 4 bytes hex, display in \$.¢

OTHER Any other information pertinent to the payment not already recorded may be added to this event type at the discretion of the monitoring system. E.g. public player ID. (Do not log sensitive information in this event like secret account numbers or PINs)

As a general rule, any type of ECT to EGM must have an event that clearly identifies the reason for the transfer as well as any other information pertinent to the transfer

4.14.1.18. "SC-EGM ECT to EGM timeout"

The SC attempted an ECT to EGM, but it did not receive an acknowledgement via the EGM meter group contribution response containing the (0x14) ECT-in group meter (QPv1.5) or ECT-to-EGM Poll Acknowledgement Response (QPv1.6). The SC must allow sufficient time for the EGM to respond w.r.t. higher priority responses before logging this event (Also refer 4.11.1).

4.14.1.19. "SC-EGM Unreasonable Meter Incr. ID: 0x<MTID> Inc: \$<AMT> met: \$<FAMT>"

Refer section on meter reasonableness tests. This event must not be logged for meters which have gone back to zero as a result of an EGM RAM clear.

Extended Event Data: <MTID><AMT><FAMT>

MTID 1 byte hex. I.D. number of meter with invalid meter. Refer Meter Group Response. Display as two characters of hex.

AMT 4 bytes hex. Amount of the calculated increment which was considered invalid, LSB first. , display up to 10 character digits of signed decimal currency.

FAMT 4 bytes hex. The new value of the meter after the increment, LSB first, display up to 10 character digits of decimal currency.

4.14.1.20. "SC-EGM Unreasonable Multi-Game Meter Incr. Gme: 0x<GVN> V: <VAR> ID: <MTID> Inc: \$<AMT> Met: \$<FAMT>"

This event must not be logged for meters which have gone back to zero as a result of an EGM RAM clear.

Extended Event Data:

<GVN><VAR><MTID><AMT><FAMT>

GVN Game Version Number (CFF), 2 bytes hex, Display as four characters of unsigned hex.

VAR Game Variation Number (CFF), 1 byte BCD, Display as two characters of decimal.

MTID 1 byte hex. I.D. number of meter with invalid meter. Number multi-game meters 0...3 in order of transmission, Display as one character of decimal.

AMT 4 bytes hex. Amount of the calculated increment which was considered invalid, LSB first. , display up to 10 character digits of signed decimal currency.

FAMT 4 bytes hex. The new value of the meter after the increment, LSB first., display up to 10 character digits of decimal currency.

4.14.1.21. "SC-EGM LP Group Contr. Fail Gme: 0x<GVN> V: <VAR> PGID: 0x<PGID> inc: \$<AMT> met: \$<FAMT>"

EGM Linked Progressive Group Contribution Failed Reasonableness (4.13.10). An invalid PGID or unreasonable linked progressive contribution was detected on a LP game's LP contribution

meter. This event must not be logged for meters which have gone back to zero as a result of an EGM RAM clear.

Extended Event Data:

<GVN><VAR><PGID><AMT><FAMT>

- GVN Game Version Number (CFF), 2 bytes hex, Display as four characters of unsigned hex.*
- VAR Game Variation Number (CFF), 1 byte BCD, Display as two characters of decimal.*
- PGID Linked Progressive group I.D. number (CFF) (0x0001-0xFFFE), 2 bytes hex, Display as four characters of unsigned hex.*
- AMT 4 bytes hex. Amount of the calculated increment which was considered unreasonable, LSB first, display up to 10 character digits of signed decimal currency in the same units as the EGM's LP Contribution meter (i.e. turnover)..*
- FAMT 4 bytes hex. The new value of the LP Contribution meter after the increment, LSB first. , display up to 10 character digits of decimal currency.*

4.14.1.22. "SC-EGM LP Award Ignored - Failed Authentication Checks. Invalid: <reason>"

This event is logged by the SC for any EGM LP Award Event which failed any of the LP event award authentication checks described in section 4.9.8. Also refer section 4.9.7.

Extended Event Data: <reason>

- <reason> Reason for failure. 8 bytes ASCII, null terminated. Refer section 4.9.8 for possible failure scenarios. Allowable reasons are: "Timestamp", "PGID", "PLVL", "GVN", "VAR", "Enrolment", "PAMT" Only the first detected 'reason' for the failure for a given event need be logged. Refer section 4.9.8*

4.14.1.23. "SC-EGM SAP Contribution discarded Gme: 0x<GVN> V: <VAR> Lev: <LEV> Contr. \$<CONT>"

This event is logged by a SC for all resident SAP levels in an EGM, whenever a SAP level current contribution amount, is not automatically restored after an EGM RAM clear or is discarded by the SC for any reason. This may be as the result of either a decommissioned EGM or EGM game conversion. I.e. if a SC ever zeros or frees memory that is storing current SAP contributions for a game, then this event would be logged by the SC at that time. The only time a SC would not be able to log this event is if its memory was cleared while its power was off.

Extended Event Data:

<GVN><VAR><LEV><CONT>

- GVN Game Version Number (CFF), 2 bytes hex, Display as four characters of unsigned hex*
- VAR Game Variation Number (CFF), 1 byte BCD, Display as two characters of decimal.*
- LEV SAP Level number 0..8, 1 byte hex, Display as one character of decimal.*

CAMT 4 bytes hex. Amount (in cents) of the SAP contribution meter which was discarded by the SC (as reported in the EGM Progressive Meters response). LSB first., display up to 10 character digits of decimal currency.

4.14.1.24. "SC-EGM SAP Initial Contribution Game: 0x<GVN> VAR: <VAR> Lev: <LEV> Contr. \$<CONT>"

This event is logged by a SC, for all resident SAP levels in an SAP EGM, whenever a SAP level contribution amount, is added after an EGM RAM clear.

Extended Event Data: <GVN><VAR><LEV><CONT>

GVN Game Version Number (CFF), 2 bytes hex, Display as four characters of unsigned hex
VAR Game Variation Number (CFF), 1 byte BCD, Display as two characters of decimal.
LEV SAP Level number 0..8, 1 byte hex, Display as one character of decimal.
CAMT 4 bytes hex. Amount (in cents) of the SAP contribution which was added by the SC. LSB first., display up to 10 character digits of decimal currency.

4.14.1.25. "SC-EGM Invalid Progressive Configuration Game: 0x<GVN> VAR: <VAR>"

This event is logged by the SC whenever it detects an invalid progressive configuration in any Progressive response type.

Extended Event Data: <GVN><VAR>

GVN Game Version Number (CFF), 2 bytes hex, Display as four characters of unsigned hex
VAR Game Variation Number (CFF), 1 byte BCD, Display as two characters of decimal.

(Programming the SC to also add additional data to this event for diagnostic purposes is recommended. I.e. specifically what was invalid about the game's progressive configuration)

4.14.1.26. "SC-EGM Unexp. Event SeqNo: Exp:0x<EXPSEQ> Rxd:0x<RXDSEQ>"

Unexpected EGM Event Sequence Number. The SC received an event from an EGM with an out of sequence event number. Refer previous Section on Event Sequence Numbers.

Extended Event Data:

ESEQ Expected Event Sequence Number. 1 byte hex, display a two chars of unsigned hex
RSEQ Received Event Sequence Number. 1 byte hex, display a two chars of unsigned hex

4.14.1.27. "SC-EGM Unexp. Purge Poll PSN: Exp:0x<EPSN> Rxd:0x<RPSN>"

Logged whenever the SC receives an unexpected Purge Poll Sequence Number (PPSN) in a Purge Events Poll Acknowledgment Response. (QPv1.6)

Extended Event Data:

EPSN Expected PSN. 1 byte hex, display a two chars of unsigned hex

RPSN Received PSN. 1 byte hex, display a two chars of unsigned hex

4.14.1.28. "SC-EGM Unexp. ECT Poll PSN: Exp:0x<EPSN> Rxd:0x<RPSN>"

Logged whenever the SC receives an unexpected ECT Poll Sequence Number (ECTPSN) in ECT-To-EGM Acknowledgment Response. (QPv1.6)

Extended Event Data:

EPSN Expected PSN. 1 byte hex, display a two chars of unsigned hex

RPSN Received PSN. 1 byte hex, display a two chars of unsigned hex

4.14.1.29. "SC-EGM Poll Sequence Number Fail"

This event is logged only after the following events have occurred; the SC detected an out of sequence PSN, it has attempted to reset the PSNs (via the Configuration Request Poll), it has re-queued the applicable poll (in this case the purge poll) and the PSN sequence mismatch occurs immediately again. Refer section 4.13.3.3 Poll Sequence Numbers.

4.14.1.30. "SC-EGM Invalid Serial Number Serial: <MID><SER>"

The SC received an invalid or unexpected incorrect EGM serial number.

Extended Event Data:

<SER><MID>

SER EGM Serial Number considered invalid, 3 bytes bcd, display as six characters of decimal

MID EGM Manufacturer I.D. considered invalid, 1 byte bcd, display as two characters of decimal

4.14.1.31. "SC-EGM Invalid Configuration"

Logged upon any received invalid EGM/Game configuration data. E.g. denomination, GVN/VAR, PGID, PNUM, PLBM, SAP configuration etc. The SC must log additional data with this event detailing specifically what was invalid, or log this information as separate events.

4.14.1.32. "SC-EGM Invalid CRanE Event Level: <LEV> RATE: <RATE>"

A CRanE event was received from the EGM by the SC with an incorrect level or rate.

Extended Event Data:

LEV CRanE ID or level. 1 byte hex.
bits 0...2 CRanE ID or level (0...7), display as one character of decimal
bits 3...7 Reserved = 0
RATE Hit Rate. 4 bytes hex, display as 8 characters of unsigned hex. Refer
QCOM.

4.14.1.33. "SC-EGM Play outside licensed hours"

The SC detected an increment in EGM stroke during non-licensed gaming hours (refer gaming venue open/close times). Note, a current game in play and communication time-outs must be accounted for when detecting this event.

4.14.1.34. "SC-EGM Disabled By System"

This event must be logged by the SC whenever an EGM is specifically disabled for some reason other than normal resumed responding procedure. This event must be logged immediately following the event which identifies the reason for the disable. This event is not applicable for incidences which disable an entire site.

4.14.1.35. "SC-EGM Enabled By System"

This event is logged by SC after the occurrence of the previously described event and all problems which caused the EGM to be disabled have been addressed.

4.14.1.36. "SC-EGM DLL Version Changed"

This event is logged by the SC upon any detected change to a given EGM's DLL CNTL protocol version field received in all EGM responses.

4.14.2. Site Controller Events

The following events are SC events and are the minimum range of events a SC must support. This list will not cover all possible SC events due to the different types and functionality of the SCs that will be in use.

4.14.2.1. "SC Processor Door Opened"

This event must disable the SC and the EGMs under it, until subsequently re-enabled by the host system computer.

4.14.2.2. "SC Processor Door Closed"

4.14.2.3. "SC Power Off Processor Door Access"

(if applicable)

4.14.2.4. "SC Power On"

4.14.2.5. "SC Power Off"

4.14.2.6. "SC Event Log Full"

4.14.2.7. "SC Meter Log Full"

(if applicable)

(For OLGR to test the previous two events, a SC must be provided with only a fraction of normal NV-RAM available)

4.14.2.8. "SC NV-RAM Battery Low"

(if applicable)

4.14.2.9. "SC Power Off Door Open Detection Battery Low"

(if applicable)

4.14.2.10. "SC NV-RAM Cleared"

4.14.2.11. "SC Site Opened"

Logged when the site is enabled initially at the start of licensed gaming hours.

4.14.2.12. "SC Site Closed"

Logged when the site is disabled at the end of licensed gaming hours.

4.14.2.13. “SC Connect Attempt Fail <Reason>”

Logged by the SC if it attempted to initiate a connection to the host but the attempt failed.

The following four events are logged by the device which is totalling the jackpot contributions. For a LAN jackpot this is the SC and for a WAN jackpot this is the host computer (substitute ‘SC’ for ‘CC’ in the event description).

4.14.2.14. “SC LP Simultaneous Win Detected PGID: 0x<PGID> Lev: <LEV>”

Logged by the jackpot system totaliser (usually the SC) upon the detection of a simultaneous LP Award event. Refer sections 4.9.5 & 4.9.7

PGID Linked Progressive group I.D. number (CFF) (0x0001-0xFFFFE), 2 bytes hex, Display as four characters of unsigned hex

LEV LP Level number 0...7, 1 byte hex, display as one character of decimal.

4.14.2.15. “SC LP Level Adjustment PGID: 0x<PGID> Lev: <LEV> Hits: <HITS> Adjustment: \$<ADJ>”

This event is logged by the SC/jackpot system totaliser whenever it receives a command from central to adjust the current amount of a jackpot level.

PGID Linked Progressive group I.D. number (CFF) (0x0001-0xFFFFE), 2 bytes hex, Display as four characters of unsigned hex

LEV LP Level number 0...7, 1 byte hex, display as one character of decimal.

HITS No of Jackpot level hits to add/subtract from total hits, 2 bytes hex., display up to 6 characters of signed decimal. Usually 1,-1 or 0. This field is zero if the adjustment is to current jackpot contribution only.

ADJ Adjustment amount to current jackpot (i.e. the amount in which the jackpot’s current value has changed by), , 4 bytes hex in cents. display up to 10 character digits of signed decimal currency.

4.14.2.16. “SC LP Level Deleted PGID: 0x<PGID> Lev: <LEV> Hits: <HITS> Wins: \$<WINS> Contribution: \$<CONT>”

This event is logged by the SC/jackpot system totaliser whenever it deletes a QCOM LP level. (Before deleting, the SC must first ensure no EGMs are still contributing to this level on this group, otherwise the SC must not allow the level to be deleted)

PGID Linked Progressive group I.D. number (CFF) (0x0001-0xFFFFE), 2 bytes hex, Display as four characters of unsigned hex

LEV LP Level number 0...7, 1 byte hex, display as one character of decimal.

The following data must contain values at just prior the level’s deletion:

HITS No of Jackpot level hits, 4 bytes hex., display up to 10 characters of decimal.
WINS Total level wins, 4 bytes hex in cents, display up to 10 character digits of decimal currency.
CONT. Current level total contribution since last hit (equals LPCAPO - R), 4 bytes hex in cents, display up to 10 character digits of decimal currency.

4.14.2.17. “SC LP Level Created PGID: 0x<PGID> Lev: <LEV> Reset: \$<RESET> Inc:<INC>% Contribution: \$<CONT>”

This event is logged by the SC/jackpot system totaliser whenever it creates a QCOM LP level.

PGID Linked Progressive group I.D. number (CFF) (0x0001-0xFFFE), 2 bytes hex, display as four characters of unsigned hex.
LEV LP Level number 0..7, 1 byte hex, display as one character of decimal.

The following data must contain values at immediately after the level’s creation:

RESET Jackpot reset level amount, 4 bytes hex in cents; display up to 10 character digits of decimal currency
INC Percentage increment, 4 bytes; display as a % number to four decimal places.
CONT. Initial level total contribution (equals LPCAPO - R), 4 bytes hex in cents, display up to 10 character digits of decimal currency. This field is usually zero for a newly created level unless some contribution is being carried over.

4.14.2.18. “SC QCOM Communications Clobbered”

Refer section 4.5.8. If a multi-loop SC then add loop ID and any other pertinent information to this event’s extended data.

4.14.2.19. “SC QCOM Loop Down”

This event must be logged by the SC upon the 3rd consecutive transmitted Date and Time Broadcast that did not echo back to the SC. If a multi-loop SC then add loop ID and any other pertinent information to this event’s extended data.

4.14.2.20. “SC QCOM Loop Up”

This event must be logged by the SC up the first successfully echoed Date and Time Broadcast after; a “SC QCOM Loop Down” event was logged for a given loop, and after a SC NV-RAM clear. If a multi-loop SC then add loop ID and any other pertinent information to this event’s extended data.

4.14.2.21. “SC NV-RTC Refreshed Difference: <SECS>”

This event must be logged by the SC if it has to update its NV-RTC time from the host system time and the difference was greater than 10 seconds (provided that it was not the first time-synchronisation since the SC was last RAM cleared). This event must be logged with the new time. (The LMO must ensure that SCs with a faulty NV-RTC must not be used. All instances of this

event for a SC must be investigated by the LMO. SCs with significant clock drifts over any time period which are causing this event must be swapped out for repair by the LMO.)

SECS 4 bytes signed integer. The difference between the SC NV-RTC time and the host system time just before the refresh.

4.14.2.22. “SC RAM ERROR <Details>”

Refer section 3.3. “Details” must indicate the type and area of the RAM error as can be determined depending on the error detection methodology being used by the SC. (This event is for diagnostic purposes and may never be sent to the host due to other requirements regarding SCs in RAM error. Refer section 3.3)

4.14.2.23. “SC RTC Fail”

This event must be logged if the SC’s RTC fails the integrity check as outlined in section 3.4.1.

4.15. Finding the Physical Order of EGMs on a QCOM Loop

With QCOM protocol EGMs, it is possible to remotely determine via the SC, the actual physical order in which the EGMs are located on a fibre optic loop. This information could be used to automatically generate loop wiring diagrams for gaming venues.

This section is for information only and may be implemented and used at the discretion of the SC developer.

The feature works by using the Broadcast NAK feature of the QCOM protocol.

The method is as follows:

The SC takes the last EGM in the QCOM Poll Cycle (the EGM polled immediately before the broadcast message is sent out) and purposely corrupts that EGM's next response by sending out the Date and Time Broadcast message early (i.e. during the EGM's response). This causes a collision of the EGM's response message and the broadcast message. As a result, EGMs physically located after this EGM on the loop will see a corrupted broadcast message and therefore will queue a broadcast NAK in a subsequent response. EGMs physically located before the EGM will see the broadcast without any corruption and therefore won't queue a broadcast NAK. By listening to which EGMs send a broadcast NAK and which do not, the SC can determine which EGMs are physically located before and after the EGM currently last in the QCOM Poll Cycle. By moving each remaining responding EGM to the end of the QCOM poll cycle and repeating the above, it is possible to reliably determine the physical order of all the EGMs on the loop.

For 32 responding EGMs, the SC must perform the test 32 times.

For complete and correct results, this feature requires the following conditions:

- The EGMs must all be responding for the duration of the procedure.
- No EGM may stop/start responding during the procedure.
- The loop should be fairly stable, i.e. little or no communication errors. The procedure (depending on how it is coded) can be made immune to a moderate level of communications errors occurring during the process.
- The EGMs must have correctly implemented the QCOM broadcast NAK feature requirements.
- The SC must have the ability to (on demand) abort waiting for a response
- The SC must have the ability to (on demand) send out a forced Broadcast message early.

For a demonstration of this feature, a QCOM loop with a few EGMs responding to the latest version of QSIM is required. Then activate QSIM "Loop Order" special function under the Poll Cycle->More... QSIM menu.

4.16. Notes for “Sniffing” QCOM LP Jackpot Displays

A “sniffing” QCOM LP jackpot display is a stand-alone jackpot display device that ‘listens’ (or “sniffs”) the QCOM protocol traffic in order to display current LP jackpot information.

To develop a stand alone “sniffing” jackpot display for QCOM LPs; ‘QSIM’, the QCOM protocol simulator may be used running on two PCs to simulate an EGM and Site controller simulating a standard LP jackpot.

Stand Alone Jackpot Displays require a configuration utility for entering the PGID for the jackpot to be monitored and displayed. Suggestion to minimise configuration errors: In addition to entering a 4 digit PGID manually, the display could also build a list of detected PGIDs obtained from sniffing the LAN and allow the selection of one of the PGIDs from the list.

Always verify all messages CRCs before using any data from them.

Always mask out or ignore unused or reserved data on messages for forward compatibility.

Listening to LP Broadcasts:

- Before using any data from a LP broadcast, ensure the broadcast has the correct function code, extended broadcast function code, PGID.
- Note there may be more than one PGID being broadcast on the LAN at any time. Jackpot display controllers need to be able to pick out the PGID and levels of interest. Do not assume any expected order or number of levels in each LP Broadcast; just process applicable PGID & levels as they appear in each LP broadcast.

Notes for sniffing jackpot displays that also perform win shows:

- These types of displays can monitor EGM traffic to get notification of LP Award Events (for the EGM, level and amount won) and LP Award Acknowledgements (which confirms the win). This also requires the jackpot display to be located at the end of the loop of EGMs on the LP jackpot.
- Jackpot displays performing win shows also need to monitor all LP award events to the get exact hit amount, PGID and level won from the EGMs. Be aware that events may be resent by the EGM on command from a SC at any time, so before using data from a LP award event, ensure the event is new and has the correct function code PGID and has a valid level number.
- Jackpot displays performing win shows must wait for the LP Acknowledgement Poll for confirmation of the LP jackpot before triggering a win show. The PGID, amount won and level won was in the last received (new) LP Award Event for the level.

Alternatively it is possible to implement a simpler stand alone jackpot display that also performs win shows by only monitoring the LP Broadcasts. The jackpot display assumes that any backward movement in the LP current amount indicates a jackpot hit. This is not as good as monitoring EGM polls/responses because win shows will have to be anonymous, there will be only one win show in the event of a simultaneous win and sometimes (but very rarely) there are negative adjustments of the LP current amounts which would cause a phantom jackpot win show. Also, without looking at the LP events the display can't be 100% sure of the exact amount won (especially in the case of a simultaneous win). This could get confusing if the jackpot is very rapid. This method is currently approved under a trial basis.

Trying to identify which specific EGM has won for a QCOM sniffing jackpot display is not easy with a QCOM v1.5 Site Controller (a QCOM v1.6 SCs will broadcast EGM serial numbers periodically). A QCOM v1.5 SC will only broadcast an EGM's serial number when the EGM is not responding and an EGM will only reveal its serial number in an EGM Configuration Response which is only seen once shortly after an EGM resumes responding. This means that sniffing jackpot displays must be on-line and listening before SC-EGM communications starts. Also, some SCs will change an EGM's poll address on a regular basis, such as every time an EGM resumes responding, this also must be handled. If the jackpot display needs EGM Poll Address-Serial number information, but can't get it because it was only recently powered up, it is recommended that it display an error message such as "EGM IDs Required", or an equivalent message. As an alternative, anonymous win shows for sniffing jackpot displays are recommended, as a QCOM LP EGM will always clearly lockup in a LP Award Lockup, so identifying the winning EGM is not an issue.

Time-Outs

There are several possible levels of time-outs applicable to a QCOM LP sniffing jackpot display. All time-outs must be clearly and uniquely displayed on the jackpot display when they occur. A communications timeout parameter must exist and be able to be configured in the sniffing jackpot display. A good default value is 60 seconds.

Possible types of time-outs of interest for sniffing jackpot displays are as follows:

- No communications whatsoever or any valid communications (i.e. w.r.t message CRCs).
- Broadcasts are received but the display's PGID of interest is not seen in any LP broadcast for the timeout period.
- A LP Broadcast update for one or more specific level/s of interest to the jackpot display is not received for the time-out period.

The recommended way of displaying time-outs for the 1st item is to clear the display and put up a large "Communications Time-out" message. For the 2nd and 3rd item it is recommended the display put up a "Time-out" message where each level's current amount would normally appear.

Aged current amounts (i.e. amount older than the timeout period or upon a display power up) must never be publicly displayed on the jackpot display. The display must wait for an update before redisplaying current amounts after a communications timeout or power up.

5. I.G.T. EGM Protocol Operating Procedures

This chapter covers the SC operating procedures with regard to the older I.G.T. EGM Communications Protocol.

5.1. General

All applicable SC events and procedures described previously must be implemented.

5.2. SC Power up and EGM Resumed Responding Procedure

If any EGMs under a SC are not responding the SC must periodically (once per second) poll the EGM's poll address via a normal poll until the EGM resumes responding.

1. Once an EGM resumes responding, an initialisation poll is immediately sent with the MEF set at disable. At the SC's option it may request meters to confirm the serial number but it must not process any meters until the EGM hash is verified as correct.
2. If any result from above is found to be incorrect or times-out (as in the case of a program hash), the SC will leave the EGM disabled, log the appropriate events and suspend this procedure until ordered to try again by either the host system computer or if the EGM stops/resumes responding. The SC may automatically retry if desired but do not keep logging the same events if the EGM continues to have the same problem.
3. If the subsequent reported configuration and program hash are correct, the SC will poll for meters and enable the EGM.

5.3. EGM RAM Reset Initialisation Procedure

1. If the SC receives a meters response from an EGM which indicates the EGM requires initialisation (as indicated all zero meters except the refill meter (do not use the event)), the SC must immediately save all last known meters for the EGM (i.e. create a meter log event/record in the SC containing all last known meters) to be sent to the host computer and follow the EGM resumed responding procedure above.
2. The SC must not enable an EGM after an EGM RAM clear until the last known meters and events for the EGM stored in the SC have been sent and stored in the host system computer.

5.4. Poll Cycle

The Poll Cycle is defined as the process of a single poll to each EGM's address followed by a global broadcast message poll. The poll cycle commences no more than once per second.

5.4.1. Frequency

The poll cycle must commence once per second under normal operating conditions. However, the poll cycle may be allowed to be temporarily slower than one second in times of heavy traffic (e.g. after a communications failure and the SC is reinitialising, or if the number of EGMs on the LAN forces the poll cycle over one second).

The SC will poll each EGM's address no more than once per second.

5.4.2. Response Timeout

The SC will poll an EGM and wait 12 milliseconds for an EGM response to be initiated before declaring a non-response.

Note, an EGM response may be initiated 0-10 milliseconds after the last received message poll byte.

5.4.3. Inter-character Time-out

During a response the SC will wait 5 milliseconds for each successive character. If an inter-character time-out occurs the SC will declare a non-response.

5.4.4. End of Broadcast Pause

To ensure the EGMs have enough time to process global messages, the SC must pause for a minimum of 15 milliseconds after the last transmitted character in a global message before transmitting any further data.

5.4.5. Poll Wait Time

A SC must wait 1.5 to 2 character times worth of no received bytes (if it doesn't already do so by default through message processing delays) before commencing a poll. This is to ensure any garbage has subsided before sending another message and allows easier debugging of a bad or faulty FO LAN. If a byte is received then wait another time out period.

5.5. Meter Exclusion Period

The meter exclusion period is defined as the following:

- After the EGM resumes responding after a non-responsive period, or SC power up, until a correct Program Hash is obtained from the EGM.
- After an invalid program hash is received until a valid hash is received.
 - After an invalid manufacturer I.D. or serial number is received on a meters response until the correct manufacturer I.D. and serial number is received.

The SC must not poll for meters during the meter exclusion period.

This exclusion period does not include progressive group contributions, they are never ignored unless considered unreasonable.

An EGM must be disabled during the meter exclusion period via its Game Enable Flag sent in the Initialisation Poll.

5.6. Polls

5.6.1. Initialisation Poll

Send after every non-responsive EGM period when the EGM resumes responding with a MEF = 0 (disabled).

If the EGM returns a valid hash result within 30 seconds then send the poll again with a MEF = 1 (enabled).

At other times when the EGM enters the Meter Exclusion Period with a MEF = 0 and when the EGM exits the Meter Exclusion Period with a MEF = 1;

This is the highest priority poll.

5.6.2. Meters poll

Meters must be requested via this poll at least once per every 30 seconds and no more than once per 2 seconds when not in the meter exclusion period.

This is the second highest priority poll.

5.6.3. Request All Logged Events Poll

This is sent by the SC when it is re-initialising after a RAM clear and/or there is a possibility that one or more events have been lost.

The SC may automatically purge duplicate received EGM events.

This is the second lowest priority poll.

5.6.4. Purge Events Poll

The SC must only ever purge events from its NV-RAM after the events to be purged have been stored fault tolerantly in the central monitoring system computer.

The SC will only ever purge events from the EGM after the meter exclusion period and the events to be purged have been stored fault tolerantly in the central monitoring system computer.

With no event sequence numbers, a window exists where it is possible to inadvertently purge events in the EGM which have not been stored fault tolerantly in the host system computer. The only way to avoid this is to actually NAK any event responses from the EGM which occur during the window until the purge is sent to the EGM and acknowledged. This is exactly how the existing IGT LCOM does it.

The monitoring system must make every effort to minimise the window.

Same priority as the Request All Logged Events Poll.

5.6.5. Normal Poll

Lowest priority poll; sent if the SC has no other higher priority poll to send.

5.6.6. Global Broadcast

The current date and time must be broadcast to all EGMs once per second at the end of the IGT poll cycle.

The current date and time is broadcast to the EGM in every broadcast message. The SC must ensure that it never inadvertently broadcasts an incorrect date or time, especially after a SC RAM clear.

The current date and time must be maintained centrally in the monitoring system and it must ensure all SC's current date and time is kept accurate throughout the network.

The Global Disable Broadcast must be used to close the site during non-licensed or non-gaming hours as discussed in an earlier chapter.

5.7. Linked Progressives

While the protocol supports linked progressives, no EGM manufacturer has implemented a linked progressive game using the I.G.T. protocol at this time. This feature is not to be implemented on the I.G.T. protocol.

5.8. SC EGM Response Error Checking

The SC must ignore any received parity or framing errors on received characters, the response message CRC is the validating methodology. An EGM will always transmit with forced zero parity.

The SC must first validate the response's address is correct, then obtain the message length from the function code byte, then receive the entire response and validate the response CRC. Only then may the SC process any further response message data provided the CRC is correct.

5.8.1. Response Poll Address

If SC receives a response to a poll where the response's address did not match the poll's poll address, it must ignore the response and consider it a non-response.

Note I.G.T. protocol poll addresses are entered manually into the EGMs once per RAM clear in the range 1...255 and cannot be changed unless the EGM is RAM cleared.

5.8.2. Security Event Response

Identical events may be discarded by the SC.

Event date and time checking is as per the OLGR EGM protocol SC procedure.

5.8.3. Event Codes.

An unknown event code is processed as normal. Valid EGM event codes are within the range 0x00 to 0x2F (and 0x80 to 0xFF for linked progressive events) inclusive.

As Event Codes from IGT Protocol EGMs do not directly correspond to the OLGR Protocol event codes, they must be remapped in the monitoring system by OR'ing the received event code by 0x7000.

5.8.3.1. Event Text

The following is a list of all defined IGT Protocol Event Codes (there a number of new event codes not list in the IGT protocol document).

The following text appearing in quotes is the text which must be used in event reports for OLGR.

"returned to normal status",	0x00
"coin-in tilt",	0x01
"coin-out tilt",	0x02
"hopper empty",	0x03
"extra coin paid out",	0x04
"reel tilt",	0x05
"diverter/optics error",	0x06
"Touch Screen Fault",	0x07
"Manufacturer spec. Fault",	0x08
"security event buffer full",	0x09
"Low CMOS RAM Battery",	0x0A
"CMOS ram error",	0x0B
"EEPROM error",	0x0C
"Reserved 0x0D",	0x0D
"Ext.prog.cont. fault/disc",	0x0E
"Reserved 0x0F",	0x0F
"Note Stacker Full",	0x10
"Note Acceptor Jammed",	0x11
"Note Acceptor Disconnected",	0x12
"Note Acceptor Fault",	0x13

"Note Acceptor door open",	0x14
"Note Acceptor door closed",	0x15
"Processor door open",	0x16
"Processor door closed",	0x17
"machine door open",	0x18
"machine door closed",	0x19
"cash box door open",	0x1A
"cash box door closed",	0x1B
"Note Stacker removed",	0x1C
"Note Stacker returned",	0x1D
"Reserved 0x1E",	0x1E
"Reserved 0x1F",	0x1F
"non progressive top award",	0x20
"S.A. progressive award",	0x21
"machine power off",	0x22
"machine power on",	0x23
"Pwr off CPU door access",	0x24
"Pwr off cash door access",	0x25
"Pwr off main door access",	0x26
"Pwr off Note accept access",	0x27
"Reserved 0x28",	0x28
"Reserved 0x29",	0x29
"Reserved 0x2A",	0x2A
"Reserved 0x2B",	0x2B
"Reserved 0x2C",	0x2C
"Reserved 0x2D",	0x2D
"Reserved 0x2E",	0x2E
"Reserved 0x2F",	0x2F

Events in the range 0x30 to 0x7F must also appear as a reserved event type as shown above.

Linked progressive events which are in the range 0x80 to 0xFF inclusive, must appear as follows.

"LP Award **[ACK] Group: x Level: x" ***

*Refer to the IGT Protocol document for more information on how to extract this event's data.

5.8.4. Signature (Hash) Response

Verify as per EGM OLGR protocol SC procedure.

5.8.5. Meter Data Response

The Manufacturer ID and Serial Number must be verified as correct with the expected ID and serial number in the system. If an invalid ID or serial number is received the SC must log the 'Invalid Serial Number' event and ignore the meters in the response.

Note, the IGT EGM Protocol states the MID field is binary, however OLGR has decided to make this field BCD to bring it in line the QCOM protocol and the protocol simulators.

Meter reasonable tests are applied as per the equivalent meters in the EGM OLGR Protocol SC procedures but the stroke meter may need to be relaxed slightly to account for the slower meter polling frequency of the I.G.T. protocol. Also note the cash box meter also may contain Notes In from the note acceptor if present.

All meters in this response must be stored by the monitoring system including reserved meters.

Note, the refill meter in this response in a tokenised EGM, also contains the EGM's denomination added in once per RAM clear upon setup. The IGT Protocol Cash Box Meter also includes total notes in.

5.9. Mapping IGT Protocol Meters to QCOM Meters

<u>IGT Meter</u>	<u>QCOM Meter ID</u>
Cents In	0x05
Cents Out	0x06
Cash Box	0x13 <i>(note, the IGT meter also includes total notes in)</i>
SAP	0x07
Cancel Credit	0x03
Refill	0x10
Turnover	0x01
Wins	0x02
Stroke	0x00

This conversion should also be used for EMA requirements.

6. Revision History

Incept Date: Unless stated otherwise, monitoring systems must be fully compliant and updated to this version of the document no later than 12 months from the (non-draft) release date of a version of the document.

Version	Changes	QIR	Who	Release Date	Incept Date
1.6.6.2	Change to new DJAG template	NA	JG	19 Apr 2016	See above
1.6.6.1 Edocs #1420449	See Below	NA	RLL	12 Dec 2013	See above
<ul style="list-style-type: none"> Allow \$50 and \$100 banknotes to be accepted (Refer 4.7.16). Effective 6 Dec 2013. <i>These banknote denominations were formerly restricted (12/2001 – 12/2013).</i> Contains some minor clarifications which have been raised over the last 3 months. (None of which should require changes to existing systems.) 					
1.6.6	See Below	NA	RLL	5 Sep 2013	See above
<ul style="list-style-type: none"> No longer recommend or mandate LPCAPO be represented or totalised in units of turnover The HRATE field is being depreciated (refer 4.13.15) 					
1.6.6 draft	See Below	NA	R.Larkin	29/7/2013	See above
<ul style="list-style-type: none"> General review Added a new SC NV-RTC sanity check on power up. Refer Section 3.4. Add more details to the SC-EGM Invalid Event 4.14.1.6 Added section on excessive events (re event 4.13.7.7) and clarified associated event types. Clarified section (4.7.10) Cash-Out Request Poll re change made in QCOM v1.6.x. Reviewed Variation hot-switch procedure/requirements (4.7.4) Increased scope slightly concerning SC LP support; however it is believed that all existing EMS already support this. Refer 4.9.1.1 Made a program hash check optional if the non-responsive period was <= 10 secs in duration. Refer sections 4.6 and 4.7.8. This is to help prevent unnecessary EGM program hash checks as they cause significant downtime. This change should significantly increase the availability of gaming in venues with moderate to heavy communications issues. Updated the LP AUTOPAY limit. Was \$500, is now \$750. Refer section 4.9.6 Increased meter sanity thresholds for WIN & CC meters to \$40,000. This is because in QCOM, SAP wins go to the WIN meter as well as non-progressive wins. (This is based on that currently QLD (clubs and hotels market) allows \$10,000 max for non-progressive wins and \$25,000 for SAPs). Refer 4.13.9.2 Add a new section concerning QCOM TITO support. Refer section 4.12. Reviewed and increased scope of QCOM EGM LAN diagnostic functions. Refer section 3.6 Added requirements for the new 'lamapoll' flag 4.7 					
1.6.4	See Below	NA	R.Larkin	20/08/2010*	See above

- Corrected apostrophe usage concerning the abbreviations of SCs & EGMs.
- Added notes concerning possible SAP CAMT sanity check. Refer 4.13.15.

*Actual publication date was 4/11/2010 (delay was due to website redesign project)

1.6.4 Draft

See Below

NA

R.Larkin

20/07/2010

See above

- Updated document to the new DEEDI report document template.
- Added document numbering to event listings.
- Clarified unexpected Program Hash Response and added a new event in that area.
- Increased default MAXSD to 30 as OLGR on occasion does approves games > 15 SD (23/9/2009)
- Increased default MAXLINES to 65535 as OLGR on occasion does approves games with many lines (23/9/2009)
- Added a <reason> field to the **SC-EGM LP Award Ignored - Failed Authentication Checks** ' event (refer 4.14.1.22) *
- Updated denomination hot-switching requirements to avoid player confusion. Refer 4.7.2.
- SPAM A in the prominent position must be used for the display of mandatory QCOM disablement messages. 4.7.20
- Added extra fields to the sequence number fail events for better diagnostics*

*When implementing in an existing EMS, this change may be implemented as supplementary events for possibly easier backward compatibility.

Version 1.6.2. Robert Larkin. Released 03/10/2008.

- Clarified 'Shared Progressive Component Flag' operation (4.13.6).
- Clarified use of 'General Reset Poll' (4.7.19)
- Updated the suggested methodology (4.13.9.2) for verification of LP wins meter movements to handle the following:
 1. Multiple LP wins during free games.
 2. Consecutive LP wins with no IDLE STATE between.
 3. A known issue with a brand of QCOM v1.5.5 EGMs
- Added procedures for dealing with SC RAM errors.
- Added "SC RAM Error" event type.
- Increased sanity threshold for 'games won' multi-game meter movements.
- Clarified denomination HS requirements re 24 hour gaming.
- Made SC diagnostic requirements mostly mandatory & general review (3.6).
- Added section 4.5.2 "Parsing over Poll Echoes & Finding Responses"
- Implemented QOGR's name change to OLGR.
- Increased excessive events threshold to cater for a Request All Logged Events when an EGM's event Queue was full.
- Added SC-EGM Unexpected PSN events.
- Added an example SC instigated ECT-from-EGM procedure.
- Progressive increments field limited to 4 decimal places

Version 1.6.1. Robert Larkin. Released 21/08/2006

- Added additional Note Acceptor Status Response validity checks and procedures.

- Clarified requirements concerning the logging of 'SC Communications Clobbered' events.
- Clarified DLL->CNTL->QPv validation.
- Added procedure for handling of the EGM Cfg. Response's->FLGS->Shared Progressive Flag.
- Had to create a separate 'SC-EGM Invalid Program Hash' event for QCOM v1.6 EGMs. This was necessary because the seeds and hashes in QPv1.5.x & QPv1.6+ are displayed in opposite byte order with respect to each other.
- Clarified Bet Meters Response handling upon an EGM Denomination Hot-switch.
- Clarified when to send LP broadcasts and with what levels in the case of negative moving current amounts (4.8.3).

Version 1.6.1 5th Draft 16/03/2006 RLL.

- Increased precision of progressive increment field from three to four decimal places (section 4.9.2.4) re QCOM v1.6.
- Clarified the use of the word "default" where necessary.
- Changes in support of QCOM v1.6.1 and clarifications due to feedback.
- No longer refer to program 'signatures' now use the term "hash" instead.
- Added/clarified a couple of requirements with regards to SPAM (re: "on time", FLG:6 and must use SPAM A)
- Added SIZ testing.
- Added "SC-EGM DLL Protocol Version Changed" event
- Reviewed and clarified CRanE requirements.
- Eased requirements regarding the logging of the "SC-EGM Program Hash OK" events in order to reduce the event load on monitoring systems.
- Added requirement for 10min delay before denomination can be changed on an EGM.

Version 1.6 18 May 2005. Robert Larkin

- Converted to word.
- General Review
- Inadvertently omitted requirement for SC to resend polls on bad (i.e. NAK'd) EGM response, Added (refer 4.13.1)
- DLL length checking. SC must no longer NAK responses > 160 bytes. This allow for responses up to 256 bytes in size in QPv1.6 (4.13.1.2)
- Clarified SC behaviour in a clobbered loop situation (4.5.8) and added event (4.14.2).
- Added new event "SC-EGM Not Responding for 3 Days" (4.14.1)
- Added new event "SC-EGM Program Signature OK" (4.14.1)
- Clarified logging of SC-EGM ECT to EGM events (4.14.1). Reason for transfer must be stated.
- Added new event "SC NV-RTC Refreshed" event (4.14.2)
- SAP meters must also be requested after every SAP event (4.7.11)
- Responsive EGMs must still be sent periodic PA broadcasts with their details in it (Refer 4.8.5).
- Un-numbered events must now be able to be stored on demand and included in event reports on demand (4.13.7).
- Special checking now required on LP Win meter movements (or the absence of movement). Refer 4.13.9.2
- New event type: "SAP Initial Contribution" (4.14.1).
- Clarified handling of unreasonable meter increments (4.13.9.2).
- Undiagnosed incidences of unreasonable meter increment must be referred to the OLGR. Refer 4.13.9.2.

- EGM must be disabled after a Request All Logged Events Poll until all events have been re-transmitted (4.7.12).
- Clarified disable SPAM re the above (4.7.20).
- Added new FYI section on finding physical loop order of QCOM EGMs (4.15).
- LP levels must be broadcast at least once every 4 poll cycles (4.8.3).
- Increased Program Signature Time-out to 300 secs (4.13.4.3)
- Added requirement for SC to disable EGM on processor door access (3.5).
- Increased requirements for maximum no. of LP groups to be supported per SC (4.9.1.1)
- Reserved one SPAM Message for OLGR use & added recommendation for maximum rate of SPAM. (4.7.20)
- Added new SC loop down/up events (4.14.2)
- **Added procedures for QCOM v1.6 (Search document for 'v1.6' for those changes)**

Version 1.5.3 5 July, 2000 R.Larkin

Made changes for QCOM Protocol Version 1.5.3 release

MGEF is now called GEF

GEF is now called MEF,

EGM Var Conf..is now called the EGM Var. Change Poll

Added new sections on Fault Tolerance & Time-Keeping.

New regulatory requirements for Note Acceptor Maint. Poll.

Biggest changes are to QCOM LP operating procedures:

Reorganised requirements.

Sim. Win handling procedures have been relaxed.

Requirements have been grouped together

Added the following new LP meters: OPAY & NUMSWIN

Deleted the last LP jackpot hit time per level and replaced it with a last JP hit time per EGM: LASTLPTIME

Changed the LP created/deleted/adjustment events (again) hopefully for the last time.

Specified more integrity checks to be done on EGM responses.

Refer red-line and strike-out text for all other changes within this document.

SCs & Monitoring system software must be updated to these requirements within 6 months of the date of this document. Upgrading SC software in the field may be done on demand.

Version 1.5.2.3 15 September, 1999 R.Larkin

Refer red-line and strikeout for exact changes.

Added another condition for a program signature check.

Clarified poll parameter defaults.

Further clarified QCOM LP Pay-all winners procedure/requirements.

Made changes to make QCOM LP more auditable.

Standardised naming prefix for event defined in this document.

Monitoring systems must be updated to these requirements within 6 months of the date of this document.

Version 1.5.2.2 11 February, 1999 R. Larkin.

Added more information to help the implementation QCOM LP.

Added 2 new events in support of QCOM LP.

This should clarify everything wrt QCOM LP.

Monitoring systems must be updated to these requirements within 3 months of the date of this document.

- Version 1.5.2.1 28 January, 1999 R. Larkin
 Reduced error checking required on EGM configuration responses
 Added section 8.3 “Automatic resetting of small EGM progressive awards lockups”
 Added more information regarding the implementation of QCOM LP
 Monitoring systems must be updated to these requirements within 3 months of the date of this document.
- Version 1.5.2 2 November, 1998 R.Larkin
 Added significant more information in regard to QCOM Linked Progressive implementation.
 Refer Redline & strikeout throughout the document for other changes
 Monitoring systems must be updated to these requirements within 3 months of the date of this document.
- Version 1.5 28 May, 1998 R.Larkin
 Any changes required of existing monitoring systems as a result of this update will not required for provisional approval.
 Updated copyright information
 Refer red-line and strike-out throughout the document for other additions and changes.
- Version 1.4 Updated to Version 1.4 of EGM Protocol Document
 Added more information on IGT Protocol event processing.
 Refer red-line and strike-out throughout the document for other additions and changes.
- Version 1.2 3 September, 1997 R.Larkin
 Added chapter on I.G.T. EGM Protocol operating procedures.
 Refer red-line and strike-out throughout the document for other changes.
- Version 1.1 Refer red-line and strike-out throughout the document for changes.
- Version 1.0 Initial release

To-do:

Consider creating a checklist.

Consider adding a response checking flowchart to clarify response checking order

Consider adding requirements for hidden LP increment support

Consider mandating for the SC to have the ability to enable only a single EGM during out of hours periods for maintenance purposes...Functionally this means the SEF can't be used. There needs to be a global MEF disable with the ability to enable one or more machines.