

**Office of Liquor Gaming and Regulation**  
**QCOM3 Functional Description**  
Version 1.0



© The State of Queensland (Department of Justice and Attorney-General) 2016-2017. Copyright protects this publication. Enquiries should be addressed to [crown.copyright@qld.gov.au](mailto:crown.copyright@qld.gov.au)

The information contained herein is subject to change without notice. The copyright owner shall not be liable for technical or other errors or omissions contained herein. The reader/user accepts all risks and responsibility for losses, damages, costs and other consequences resulting directly or indirectly from using this information.

Copyright protects this publication. Your use of this publication is subject to the terms and conditions of the licence agreement entered into between you and the State of Queensland, acting through the Department of Justice and Attorney-General ('the Department'). If you have not entered into a licence agreement with the Department, then you are not permitted to use this publication except to the extent permitted by the Copyright Act 1968 (Cth). If you would like to enter into a licence agreement with the Department to use this publication, please contact the Office of Liquor and Gaming Regulation on 13 QGOV (13 74 68) or visit <https://www.business.qld.gov.au/industry/liquor-gaming>

**OLGR – Technical Unit is independently certified to ISO 9001:2008 by SAI Global Ltd**

# 1 Contents

1	Contents	3
2	Introduction	4
3	Definitions / Abbreviations	5
4	General	5
5	QCOM3 Functionality	5
	Revision History	13

## **2 Introduction**

### **Policy**

EGMs in Queensland are required to be connected to a Monitoring System.

### **Purpose**

To describe the intended new functionality for “QCOM3”, the proposed successor to QCOM 1.x.

### **Scope**

TBA

### **Prerequisites**

This document assumes the reader has a thorough knowledge of EGMs and their operation. Some Software IT/Computer systems engineering experience or background would be beneficial.

This functional description may be subject to change in future revisions.

### 3 Definitions / Abbreviations

EGM Electronic Gaming Machine, or simply Gaming Machine

### 4 General

QCOM3 will be fundamentally based on **Internet Protocols** and make use of existing, proven and available Internet Protocols as wherever possible as an alternative to developing a propriety protocol for any given task.

The physical Layer of the EGM the interface will be Cat-5 Ethernet with possibly additional ESD protection on the Ethernet port.

QCOM3 will encompass all the functionality of previously released versions of the Queensland QCOM EGM protocol, however new functionality is being introduced in order to meet the needs of many jurisdictions and new technologies.

One of QCOM3's primary aims is to standardise areas which will benefit the integration of gaming systems and to not contribute to an unnecessary amalgamation of any roles or services into a sole provider. At a gaming venue QCOM3 will require a single monitored/managed network able to be shared by many providers running a variety of protocols other than QCOM3.

Some new QCOM3 functionality is not being disclosed at this time due to IP protection reasons.

Not all functionality described in this document will be mandatory; this will be clarified at later time.

QCOM3 is intended to support a wide variety of machine gaming arrangements from stand alone EGMs to server based gaming. While EGMs are referred to throughout this document, in QCOM3, only the application layer protocols will actually be specific to EGMs. I.e. the QCOM3 standard will primarily specify a standard for the secure monitoring and control of a wide distributed arrangement of computers from multiple manufacturers. Ultimately QCOM3 will be a specification comprising of more than one document, but ultimately only one of those documents will actually refer to EGMs.

### 5 QCOM3 Functionality

#### Multi-Protocol Support.

QCOM3 is intended to co-exist with any number of other IP based protocols. It is envisaged that EGMs will be also communicate on a number of other protocols on the same network as QCOM. For example, FTP or torrent based protocols for the downloading of new game content would be one example of many. It is envisaged that EGMs of the same brand will communicate with each other on a regular basis via proprietary internet protocols in order to provide for example; multi-player games, or the synchronisation of animations across EGMs.

It is QCOM3's goal to utilise as many open standard protocols and to avoid reinventing existing protocols wherever possible. For example where the QCOM v1.x protocol specified a protocol for

controlling the time on an EGM, QCOM3 will simply specify the use of the open standard Network Time Protocol (NTP) with any necessary caveats.

### Multi-Master Support.

The primary new feature of QCOM3 is the fact that the protocol will be a *multi-master* protocol. QCOM v1.x.x was limited in that only a single entity (e.g. a Site/Venue Controller) was able to communicate to the EGMs and perform all functions, such as the ability to send credit, lockup an EGM, or send messages to an EGM's display. While this was of little consequence to machine gaming in Queensland, this has been a hurdle for the acceptance of QCOM into numerous other markets.

Examples of the types of services that will be catered for QCOM3 as potentially mutually exclusive roles from multiple providers are (in no specific order):

- Cashless Gaming
- Paging Systems
- Gaming Venue Management Systems
- Jackpot Systems
- Jackpot Display Systems
- Jackpot Totalising
- Basic Monitoring and control
- Configuration Management
- Provision of News and Information
- Game Content Provider

Some of the roles (such as Configuration Management) above may be able to be performed via a proxy using Digital Certificates/Signatures via PKI technology.

Some of the new roles that will be created as a result of moving to Internet based protocols and QCOM3 will be:

- Network Intrusion Monitoring and access control
- Network Quality of Service monitoring and control thereof
- IP port/socket management.
- Trusted Key/Certificate revocation host
- NTP Sever host

### Increased Extensibility.

While QCOM v1.x.x was quite extensible, it had a limitation in that existing messages could only grow larger as new elements were added to them. QCOM3's fundamental unit is the individual element and messages do not grow larger as new elements are added to the protocol specification. In addition, clients do not have to send redundant information to an EGM to change a single parameter in the EGM, as each element can be operated on individually or as a part of a larger group. Extensibility will be on a par with XML but with the provision that unknown elements will be tolerated to allow the protocol to be extended in a timely manner.

QCOM3 also recognises that new elements may be needed for each new game. These will be able to be incorporated into QCOM3 seamlessly without requiring system upgrades every time.

QCOM3 will support selectable audit trail logging of any or all of its elements.

### System Independent Linked Jackpot Support.

The control of the prize amount and contributions will be optionally controlled by a third party, such as the EGMs themselves. It will also allow linked jackpots to be securely configured and operated without monitoring system support if desired (but unlikely that this will be a typical configuration). The monitoring system will always be able to monitor and audit the jackpots via a standard set of meters, as well as control EGM enrolment.

The reason for this new functionality is due to the wide range of possible methods concerning jackpot prize totalising that are currently available and will be available in the future. Assuming that linked progressive jackpots will always be of the form start-up prize plus a percentage increment of turnover is a limitation in an EGM protocol. Accordingly, QCOM3 does not assume this behaviour. In QCOM3, it is possible that the EGMs themselves will control their own jackpot totalising. The EGM will report full details of what their jackpot totalisation methodology is to the monitoring system or authorised user for information/auditing purposes.

The main benefit of this feature is that it will promote and expedite new and innovative linked jackpot arrangements.

Finally, also in support of linked progressives QCOM3 will also propose a general purpose protocol for the hot swapping of a primary totaliser for a linked jackpot arrangement in the event that that the current primary totaliser is powered off or is taken off-line.

### Access Control.

QCOM v1.x was a single user protocol and in addition, did not implement any access control. QCOM3 however, will have user access control down to the element level. The QCOM3 protocol will be represented like a hierarchical tree of elements, much like a hierarchical directory of files on a hard-drive. Each directory or file (file = element) will have access control settings. All the individual roles (listed previously) will be equivalent to users with corresponding access rights. Groups of users will also be supported. This is the key to being able to dynamically customise QCOM to cater for the particular needs of any jurisdiction.

For example, one jurisdiction may wish to allow a venue to set its own maximum hopper pay limit, while another jurisdiction may require this parameter to be only writeable by a licensed monitoring operator. QCOM3's access control mechanism will allow both scenarios to be easily catered for. Another example would be one jurisdiction may wish to only allow authorised users (i.e. systems) to be able to read certain elements of QCOM3, such as a program seed and hash result manifest, while another jurisdiction may wish this to be public information.

(Defaults concerning access control would typically be setup at EGM commissioning, but can be changed on demand at any time. Typically the regulator will issue a digitally signed script that is applied to the EGMs and sets up the initial users, certificates, groups and associated access control settings.)

For each element or group in QCOM3, the user (provided they have the rights to do so) will be able to perform the following operations

- Read
- Write
- Subscribe to changes (log changes to an event queue of the user or group)
- Assign it to a broadcast triggered by time, or other event in the EGM.

It is also pointed out that event themselves (faults conditions/lockup events etc) will also be able to individually be subscribed to by any user or group. So any occurrence of that event will be logged into the subscriber's event queue.

One method of accessing at least some of the EGM's dataset will be the use of the Network File System (NFSv4) protocol. The QCOM3 data hierarchy would be thus represent by a number of files (XML format) and directories on the NFS. (It is also currently being considered whether or not to additional support the Server Message Block (SMB) protocol provided the required level of security can be achieved.)

### Security, Encryption and Authentication

SSL/TLS will be the workhorse in this regard with certificates and full PKI support.

Most protocols within QCOM3 will run over TCP allowing them to be easily wrapped up in SSL/TLS as required. UDP based protocols utilised where security is also required will use the Datagram Transport Layer Security (DTLS) protocol.

QCOM3 over a VPN (OpenVPN) will also be a possible mode of operation.

### Program Hash support.

Formerly an EGM would return a single hash result for the whole EGM. In QCOM3 the hash result will be broken down into a hierarchy of hashes or manifest. The minimal hierarchy will comprise of a number of mutually exclusive hashes of at least the following components; EGM (BIOS, OS and applications), Game (graphics, sound and rules), Variation (reels strips/pay-table), Progressive Variations. The use of a seeded, secure hashing algorithm will continue, however everything with a QCOM3 hash will also be authenticated by the EGM via Digital Signatures. In Queensland all programs and important data will have at least two certificates; one from the EGM manufacturer and one from the regulator which will denote the regulatory approval. The number of certificates will be scalable.

### Secure Proxy Scripting.

In QCOM3, typically a 'user' will log into an EGM and monitor and control the EGM according to their access rights, however it will also be possible for an off-line user to publish a digitally signed script, which can be sent as a file to the EGM by any other user with logon rights. When the file is received by the EGM, the script will be executed by the EGM with the rights of the signatory (provided the digital signature of the script authenticates). This allows for example third parties to securely configure EGMs (within their access rights) without having to directly interact with the EGMs themselves. Scripts will have expiry dates and optionally other restrictions on scope such as being limited to a specific EGM, group or brand of EGMs, or the gaming venue.

For example, a regulator not directly involved in frontline monitoring would issue a signed configuration script that configures initially all the regulatory items of interest in the EGM as well as initial access control rights, users and groups of the EGM. This script could then be distributed to



the monitoring operator or even the manufactures for execution upon EGM commissioning or EGMs coming out of the factory.

Another example would be when a regulator wishes to introduce a new authorised cashless gaming operator (user) to the EGMs. One way to do this would be via regulator digitally signed script that performs the required configuration on the EGM. This script could be provided to the new client themselves in order to introduce themselves to the EGMs without the need of third party if desired.

In some cases, such as EGM software upgrades more than one signatory will be required on a script. This feature will be scalable to more signatories in subsequent versions of QCOM3 if demand dictates.

An alternative to this would be that the EGMs are simply directed to a host server which provides the necessary authenticated information.

### Server Based Gaming Support.

QCOM v1.x.x was a protocol between a single EGM and a Site/Venue Controller. QCOM3 will be a protocol whereby any single entity on the network can potentially represent one or more EGMs. QCOM3 will also take into consideration the possibility of a large number of games with a rapid swap in/out rate.

### Protocol Driver Support.

Protocols are typically delivered as either binary or source code drivers and all the implementer has to do is interface with the driver (after either installing and/or compiling). It is more unusual to have to implement a protocol driver from scratch which was primarily the case with QCOM v1.x.x<sup>i</sup>. Accordingly, for custom protocols that QCOM3 may specify, there will be available as driver modules in source code format to allow cross compiling onto the target platform. These modules will be released under a license similar to LGPL to enable it to be incorporated into proprietary software. If the available drivers are utilised (which will be optional) then this will have the potential effect of reducing communication implementation/evaluation costs to possibly less than 5%-10% when compared with a developer that implements the driver from scratch, and it will move most of the communications protocol testing into the high level application layer.

Another obvious benefit here comes from the fact that many peers will be reviewing the QCOM3 driver source and providing feedback which will contribute to more robust and secure protocol drivers.

It should be noted that any existing open libraries QCOM3 will utilise will be GNU LGPL or equivalent license.

### EGM Audit Mode.

---

<sup>i</sup> The QCOM v1.x.x SDK did come with source code for a QCOM event queue as well as protocol structure mapping. Those manufacturers that utilised it, proved it could save time and cost.

EGM Audit Mode access will be represented in QCOM3 as just another user and therefore audit mode will be able to inherit customisable access rights. For example one jurisdiction may wish to allow the audit mode user to be able to change the hopper payout limit, but another jurisdiction wishes this element to be read only. This will be easily configurable in QCOM3 as audit mode will just be another user.

QCOM3 EGMs will be required to have all the functionality currently provided in EGM audit mode to be also available remotely over the network, accessible via any popular web browser. This would also include last play recall. The delivery mechanism can be via any of the standard protocols currently supported by popular web browsers the exact details of the implementation will be up to the EGM manufacturer. However the user must be required to login to the EGM via SSL/TSL.

Also to a limited extent, possibly some specific parts of EGM test mode will also be available over the network, for example the ability to efficiently test the EGMs lamps by being able to turn on all the EGMs lamps over the network (currently also a QCOM v1.x feature).

### Remotely Upgradeable EGMs (RUGMs)

QCOM3 will support RUGMs, in fact EGMs operating under QCOM3 **must** be remotely upgradeable. This is a **mandatory** requirement. This is because QCOM3 utilises widely implemented IP based protocols; QCOM3 EGMs **must** be RUGMs so that their core applications, drivers and operating systems are able to be efficiently remotely upgraded with the latest security fixes as required.

Naturally this feature extends directly into downloadable games and server based gaming.

For more information regarding RUGMS, please refer to the OLGR publication Principles for Remotely Upgradeable EGMs (v 1.3) available for download from the OLGR website.

### DRM Support.

QCOM3 will support manufacturer DRM in terms of the logging of DRM license keys and equivalent information. (QCOM v1.6 already has this feature)

### Player Information Displays

An enhanced version of the existing PID functionality is being proposed. Every possible item of information displayable in a PID will have a unique ID number. E.g.: %RTP, Standard Deviation, highest prize, etc. Each of these items will be able to be toggled on/off in order to control the overall information presented in the game's PID display. This will allow more flexibility with regards to PID than is available in QCOM v1.x which only had an overall PID ID per jurisdiction.

Ideally, in the longer term, it is proposed that QCOM3 EGMs could have an integrated web browser. A keyboard interface to the browser would not be required but the EGM would have link activation/navigation capability via the EGM button panel for when a touch screen is not available. There would be no manual URL entry. There would be an information button on the EGM, which when activated by a player would activate the internal browser pointing to an arbitrarily set URL in QCOM3. During normal operation, this could provide arbitrary venue/regulatory information to the player and also with a suitable API, could replace functionality currently concerning PIDs. This

kind of functionality could be expanded for example, to interface with a monitoring system or VAS during configuration or important EGM states as the base URL could be changed depending on what state/mode the EGM was currently in. A player could check their account balance. Or when the EGM was disabled by the system, the base URL could provide a link to detailed information regarding any issue with the EGM. There are unlimited possibilities here.

To reduce security issues with the concept of an integrated web browser in an EGM, it will be setup so that the EGM will only connect to a restricted set of web servers with certificates. I.e. so the EGM cannot be directed to any arbitrary website for hacking purposes. (This will be a general rule in regards to whenever a QCOM3 EGM has to connect to a server.)

### Offline Support.

QCOM3 EGMs will be able to be configured for off-line operation if desired (I.e. ongoing game play without the need for a monitoring system). In its simplest form, this amounts to a set of configurable communications time-out parameters and configurable auto-purging event queues. This functionality and the security thereof are delivered by other functionality already described in this document.

Also in support of off-line operation will be the ability to download licensed operating hours. This will largely replace functionality currently delivered by the QCOM protocol's Site Enable Flag.

### Timekeeping in QCOM3

Timekeeping in QCOM3 simply will be via the Network Time Protocol (NTP).

The issue of clock server hacks in order to get the EGM to accept expired scripts or certificates will be addressed.

### EGM Debugging

With appropriate restrictions on access control and functionality concerning the security and integrity of the EGM, QCOM3 EGMs are encouraged to provide a read-only application network enabled debugging tools in their EGMs via protocols of their choosing. A standard protocol is not being mandated here as it does not benefit the integration of gaming systems and therefore is outside QCOM3's mandate. Not to mention it will allow existing debugging tools to be brought on-line with very little expense.

### Additional miscellaneous New Features of QCOM3

Network instigated:

- Non-volatile RAM clears.
- Rebooting.
- Volume control
- Power Off
- Power On

In addition:

- Extension and enhancement of the QCOM NADS concept (Note Acceptor Descriptor Strings) to all intelligent devices of significance in an EGM.
- Enhanced power-save capabilities. For example a new green power-down command with a wakeup time.
- Support for Internationalisation. EGMs will be informed of country/currency/language details for its use. (Actual support for other jurisdictions in this regard will be up to the individual EGM manufacturer.)
- Floor/location support
- Anything optional in the protocol will have a corresponding capability flag to indicate its implementation or otherwise.

### Further Reading related to QCOM3

In general refer to:

<http://www.olgr.qld.gov.au/resources/gamingServices/index.shtml>

Specifically the documents:

- QCOM Protocol (v 1.6.3f) (ZIP 3,685 K)
- Principles for Remotely Upgradeable EGMs (v 1.3) (Word 315 K)
- Electronic Seal Min. Requirements (v 1.0) (PDF 55 K)
- Use of hard drives in gaming devices v1.0 draft (PDF 40 K)
- Program Storage Device Verification (v 1.7) (PDF 85 K)
- EGM Program Signature Algorithms (v 1.4) (Word 465 K)

## Revision History

Version	Changes	QIR	Who	Release Date	Incept Date
0.1 draft	1st draft	NA	RLL	NA	NA
0.2 draft	28/1/2008 Added browser support. Added methodology for program hashing. EGM based Linked Jackpot Arrangements.	NA		NA	NA
0.3 draft	And expanded functionality and descriptions thereof	NA	RLL		
0.4 draft	Front page statement regarding IP protection removed as requested.  Consistent use of term 'EGM' (remove refs to 'Gaming Machines')	NA	RLL	27/07/09	NA
0.5 draft	Updated to DEEDI report template. No other changes.	NA	RLL	20/8/2010	
1.0	Updated to Qld Gov report template. No other changes.	NA	RLL	08/09/2017	NA