

Deterministic Queuing Service

ACK have produced an intelligent communications resource manager for installations where a large population of client PCs (connected to a TCP/IP network) wish to contend for access to a much smaller number of circuits that connect a central site to the authorisation centre.

This is very different from a central EFT server as all low-level EFT functionality is retained at the point of sale which permits each POS to operate autonomously. However, DQS allows a merchant to route all EFT traffic over a VPN or WAN and use a single high-speed link to the authorisation centre for rapid turnaround of authorisation requests.

Typically, the client PCs will be point of sale devices distributed around a local or wide area network and the destination network is the authorisation centre for credit / debit cards to which the communications link is ISDN, X25 or TCP/IP with a limited number of virtual circuits that become available on a random basis.

Objectives:

The objective is to provide a service capable of the following:

Managing many-to-one connections – this caters for configurations where a large population of client PCs need to contend for a small number of out-bound circuits,.

Managing one-to-many – this caters for situations where a small number of clients can make full use of all available out-bound circuits.

In bound connection requests are handled on first-in first-out basis.

Out-bound connection requests to be controlled in a dynamic manner – thereby ensuring out-bound circuits are used immediately they become available and not according to preference or weighting of the in-bound connection requests.

In-bound connect requests are always accepted even when all out-bound circuits are engaged

Method of operation:

The ACK Deterministic Queuing Service will accept a valid in-bound open-socket request and will determine that connection is desired to an out-bound socket, which may be one of several.

1. DQS will log the IP address of the in-bound requestor and will monitor the connection for an explicit socket-closed network message and connection duration. Should the open-socket duration approach 25 seconds (e.g. before a response has been received from the authorisation centre) an APACS 30 Hold message will be sent to the requestor's IP address which will avoid the possibility of timing loops and lock-outs.

2. DQS will determine the availability of a suitable out-bound socket and will pluck the next request from the queue.
3. If the request is still valid, DQS will pass the request to the out-bound socket and delete the entry from the queue.
4. If the request is no longer valid (timed out or cancelled) DQS will discard the request.

A full audit log is maintained of all in-bound and out-bound traffic.

DQS – main components:

The principle components of DQS and their purpose are as follows:

TCP/IP connection manager - functions:

- i) Listen for in-bound open socket requests and close socket requests made by clients on the network.
- ii) Issue immediate TCP/IP acknowledgement to valid requests to the calling client.
- iii) Forward in-bound authorisation request packets to the Queue manager along with the socket number on which the connection was made.
- iv) Verifies that valid data is present in the request packet.

Queue manager – functions:

- i) Adds the request to the queue along with a timer for each request
- ii) Resolves the socket number of the in-bound message with a valid out-bound socket.
- iii) Opens out-bound socket.
- iv) Plucks the next request from the queue and verifies if the request is still valid and forwards valid requests to the next available out-bound socket.
- v) Queues request if no out-bound socket available.
- vi) Monitors for response from out-bound socket and request message timer.
- vii) Sends APACS 30 'HOLD' message to requesting client if request message timer is approaching 25 seconds and no message is received.
- viii) Returns response from authorisation host to requestor.
- ix) Discards messages from queue if requesting client closes connection (or is forced closed).

Event log manager – functions:

- i) Logs all events.

System sizing and Configuration:

The overall processing power requirements are relatively light, but robustness and speed of operation will be governed by the ability to maintain in memory all outstanding requests. The system should therefore be a high-reliability PC platform capable of running Windows 2000, or better, with 512mb of RAM.

Configuration parameters will be held in an INI file and will consist of a valid in-bound and out-bound socket numbers and corresponding re-mapping table.

The out-bound socket address must correspond to valid socket address of the central router.

Frequently Asked Questions:

- Q. How does DQS work with an X25 service that has a limited number of virtual circuits?
A. DQS is typically configured to accept multiple in-bound connection requests to a single socket address which corresponds to multiple out-bound socket addresses. The out-bound socket addresses relate to the same number of virtual circuits configured in the router which is handling the X25 link to the authorisation centre.
- Q. How are different authorisation hosts made available?
A. Multiple instances of DQS can be configured to run concurrently on one machine and each will typically have different in-bound socket addresses and out-bound socket addresses which will route the connection request to the desired location.
- Q. What happens if the DQS machine goes out of service? or some other network error occurs which renders the DQS machine unavailable?
A. A secondary DQS machine should be installed at a disaster recovery site. Automatic switching to the secondary DQS machine will be performed either by the network or by the requestor client. For example, if a network failure occurs, the network recovery mechanism will automatically re-route the open-socket request to the secondary DQS machine. If the primary DQS fails, the network would not notice, but the requestor will know that the open-socket request failed and will automatically fail-over to a secondary socket address which corresponds to the second DQS machine.

If neither DQS machine is available, the requestor PC is able to perform local or voice auths.

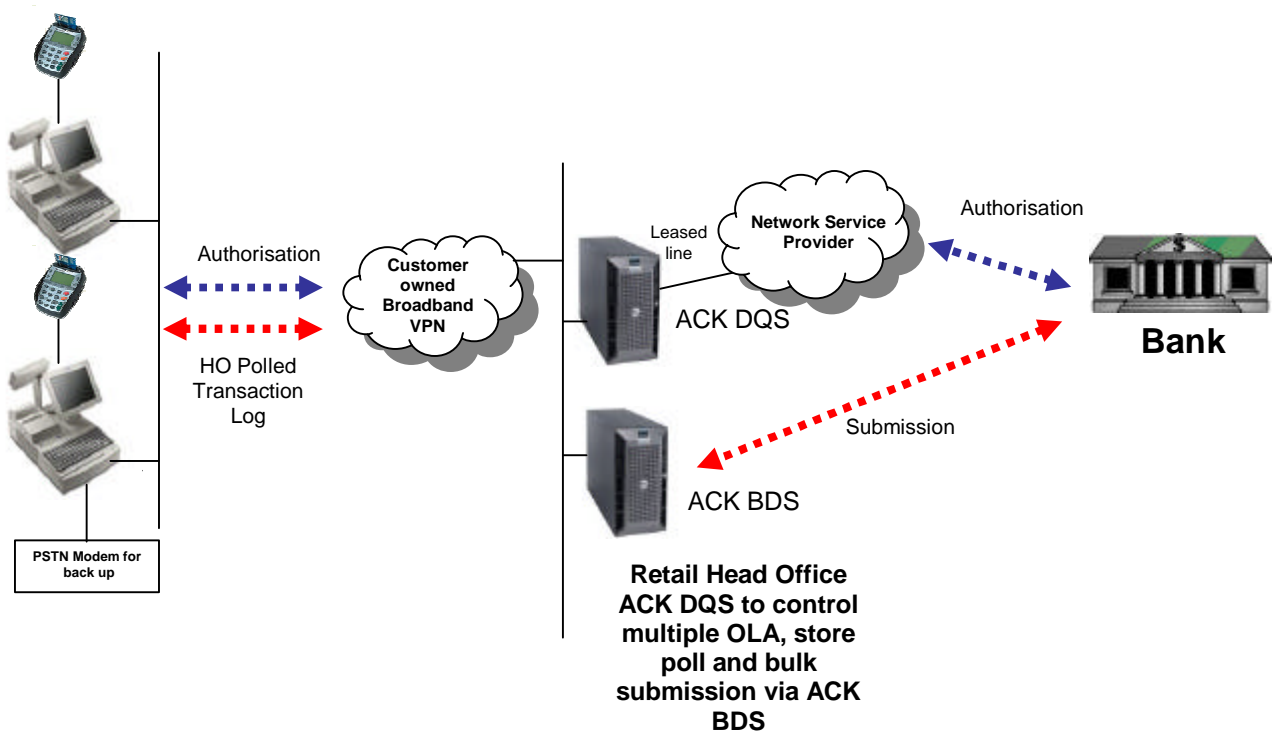
- Q. What happens when my network grows and I want to spread the load?
A. DQS can be configured to cascade requests from one DQS to another – the possibilities are limitless!
- Q. How can DQS save me money?
A. DQS allows a high number of in-bound IP addresses to contend for a much smaller number of out-bound IP addresses. The out-bound addresses typically have a one-to-one relationship with the SVC (Switched Virtual Circuits) on the X25 link. DQS therefore allows the user to recover the costs of DQS very rapidly because he only needs to lease a small number of SVCs which are leased on a monthly basis for a fixed 12 month term.
- Q. Can DQS be used to share ISDN circuits when using routers?
A. DQS can be used to manage multiple connection requests and queue them for a single ISDN router, but because the acquiring banks do not accept multiple concurrent transactions or interleaved transactions, there is limited merit in using DQS in this way - particularly where peak traffic demands will result in elongated response times.

Even when multiple ISDN routers are used, it must be understood that they are usually only capable of handling two concurrent sessions (one per 'B' channel) and will present a unique IP address to DQS with a natural limit of two ports: adding multiple routers will not enable DQS queue multiple requests to alternative IP

addresses - it is designed to queue multiple requests to a single IP address with multiple port addresses.

Note that the ACK ECP software running on the EPOS system has the ability to automatically switch to an alternative IP address, which could be another router - this approach will provide the same performance and switching capabilities as DQS in this type of configuration.

- Q. Can DQS be used with a GPRS router?
 A. Yes. The full advantages of DQS can be used in conjunction with a GPRS router so long as it follows the principle of presenting a single IP address with multiple port addresses. This approach can be a cost effective alternative to ISDN circuits where peak traffic demands are spasmodic as it saves the rental on multiple ISDN circuits.



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