

# *IBM WebSphere MQ Security: Latest Features Deep Dive*

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## *Agenda*

### ■ IBM® WebSphere® MQ V8

- ▶ Announced 22<sup>nd</sup> April 2014
- ▶ Availability dates
  - eGA: 23<sup>rd</sup> May 2014
  - pGA: 13<sup>th</sup> June 2014

### ■ New Security Features

- ▶ Changes for Channels using SSL/TLS Certificates
- ▶ User ID & Password Connection Authentication
- ▶ Hostnames in CHLAUTH (separate presentation on next!)

# Changes for Channels using SSL/TLS Certificates

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## Agenda

- Requests for Enhancement
- Changes for Channels using SSL/TLS Certificates
  - ▶ Recap
  - ▶ Single Queue Manager Certificate
  - ▶ Per Channel Certificate
  - ▶ Certificate Matching

# Request for Enhancement (26672)



**Headline:** Requesting the enhancement to support for SSL certificate per channel or group of channels  
**ID:** 26672

[Details](#) | [Comments](#) | [Attachments](#) | [Reconsideration](#) | [Release plans](#)

**Status:** [Under Consideration](#)

**Visibility:** Public

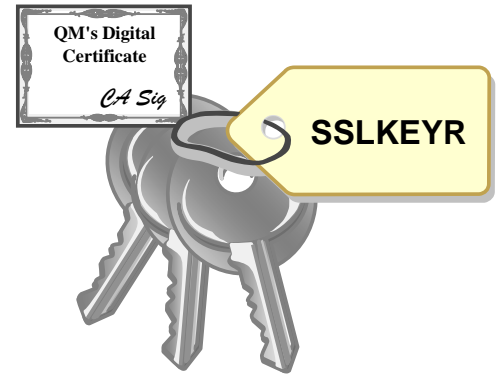
**Description:** Currently mq supports only one default signed certificate per queue manager. When one firm is connecting with multiple external firms, then any of these external firms can pretend to be a different external firm, if they can guess the channel name and sslpeername and connect. Especially if the channel names and sslpeers are following certain naming conventions. Another problem is, every time when the certificate chain changes, every party that is connecting to this qmgr needs to refresh their store with the new chain. So having a certificate per channel or group channels instead of one certificate for all channels on the queue manager is the solution here. We would like IBM to consider this as high priority.

**Use case:** The description itself is covering the use case scenario.

**Bookmarkable URL:** [http://www.ibm.com/developerworks/rfe/execute?use\\_case=viewRfe&CR\\_ID=26672](http://www.ibm.com/developerworks/rfe/execute?use_case=viewRfe&CR_ID=26672)  
A unique URL that you can bookmark and share with others.

# Key Repository

- **Contains Entity's own Digital Certificate**
  - ▶ z/OS Queue Manager
    - ibmWebSphereMQ<QMGr Name> (mixed case) label
  - ▶ Distributed Queue Manager
    - ibmwebspheremq<qmgr name> (lower case) label
  - ▶ Client
    - ibmwebspheremq<logon userid> (lower case) label
  - ▶ Digital Certificates from various Certification Authorities
- **On z/OS Queue Managers**
  - ▶ Keyring name
- **On Unix®, Windows®, iSeries® QMgrs**
  - ▶ Key database path
- **Clients: mqclient.ini file**
  - ▶ SSL Stanza – SSLKeyRepository
- **MQCONN (MQSCO structure)**
  - ▶ SSLKeyRepository
- **Environment variable**
  - ▶ export MQSSLKEYR=var/mqm/ssl/key



**ALTER QMGR SSLKEYR(CSQ1RING)**

**ALTER QMGR  
SSLKEYR('var/mqm/qmgrs/QM1/ssl/key')**

**mqclient.ini  
SSL:  
SSLKeyRepository=C:\key**

# Key Repository – Notes

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- **Queue Manager**
  - A digital certificate contains the identity of the owner of that certificate. Each WebSphere MQ queue manager has its own certificate. On all platforms this certificate is stored in a key repository using your digital certificate management tool, e.g. in RACF® (z/OS) or iKeyMan (UNIX and Windows).
  - On z/OS, the required certificate in the key repository is specified with the mixed-case label ibmWebSphereMQ<QMGr Name>. On UNIX, Windows and iSeries, the required certificate in the key repository is specified with the lower-case label ibmwebspheremq<qmgr name>. Note that the certificate label is also sometimes referred to as its "friendly name".
  - The key repository is specified on the WebSphere MQ QMGR object using the ALTER QMGR command. On z/OS this is the name of the keyring object in the External Security Manager (ESM), and on the distributed platforms this is the path and the stem of the filename for the key database file.
- **Client**
  - Generally each user of the WebSphere MQ client has a separate key repository file, with access restricted to that user.
  - This key repository file is accessed using the environment variable MQSSLKEYR, or the MQCONN SSLKeyRepository parameter.
  - A particular personal certificate within that file is selected for use on the client's SSL channels. Clients use the certificate labeled with ibmwebspheremq followed by the logon userid, wrapped to lower case.
- The key repository generally also contains a number of signed digital certificates from various Certification Authorities which allows it to be used to verify certificates it receives from its partner at the remote end of the connection.

# Single Queue Manager Certificate

- **Name Queue Manager Certificate**
  - ▶ Using CERTLABL attribute

- **Name Client Certificate**
  - ▶ mqclient.ini file SSL Stanza
    - CertificateLabel
  - ▶ MQCONN (MQSCO structure)
    - CertificateLabel

- **Environment variable**
  - ▶ export MQCERTLABL=MyCert

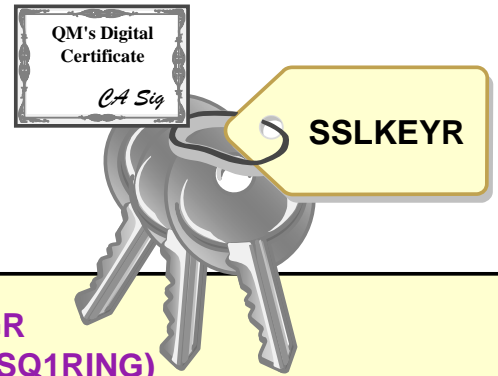
```
MQCNO cno = {MQCNO_DEFAULT};
MQSCO sco = {MQSCO_DEFAULT};

cno.Version = MQCNO_VERSION_4;
sco.Version = MQSCO_VERSION_5;
memcpy(sco.KeyRepository, ...);
memcpy(sco.CertificateLabel,...);
cno.SSLConfigPtr = &sco;
MQCONN( QMName,
        &cno,
        &hConn,
        &CompCode,
        &Reason);
```

**ALTER QMGR**  
**SSLKEYR(CSQ1RING)**  
**CERTLABL('CSQ1Certificate')**  
**CERTQSQL('SharedCert')**

**ALTER QMGR**  
**SSLKEYR('var/mqm/qmgrs/QM1/ssl/key')**  
**CERTLABL('QM1Certificate')**

**mqclient.ini**  
**SSL:**  
**SSLKeyRepository=C:\key**  
**CertificateLabel=MyCert**



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# Single Queue Manager Certificate – Notes

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- Before WebSphere MQ V8, the label name for a digital certificate to be used by the queue manager (or an MQ Client) was fixed by MQ. You had to label your certificate exactly as WebSphere MQ required it, in order for the certificate to be found. This doesn't always meet customer standards of certificate labelling.
- In WebSphere MQ V8 you can provide your own label name for the queue manager (or an MQ Client) to use.
- For the queue manager you have a new attribute on ALTER QMGR called CERTLABL (and additionally CERTQSQL on z/OS for a QSG level certificate – previously located with the label ibmWebSphereMQ<QSG-name>).
- For clients, you can provide the Certificate label in the MQSCO structure (along with the SSLKeyRepository location); or in the SSL stanza in the mqclient.ini file (along with the SSLKeyRepository location), or using the environment variable MQCERTLABL.

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## Use Cases

- **Following company policy on certificate labelling**
- **Using the same certificate for more than one queue manager**
  - ▶ Not that we would condone this!
- **Migrating over to a new certificate when main certificate is ready to expire**
  - ▶ Used to have to issue GSKit/RACF commands to rename certificate
    - `ibmwebspheremqqm1 -> ibmwebspheremqqm1old`
    - `ibmwebspheremqqm1new -> ibmwebspheremqqm1`
    - `REFRESH SECURITY TYPE(SSL)`
  - ▶ Now just MQ commands when the time comes
    - Current label is 'QM1 Cert 2013'
    - `ALTER QMGR CERTLABL('QM1 Cert 2014')`
    - `REFRESH SECURITY TYPE(SSL)`

## Use Cases – Notes

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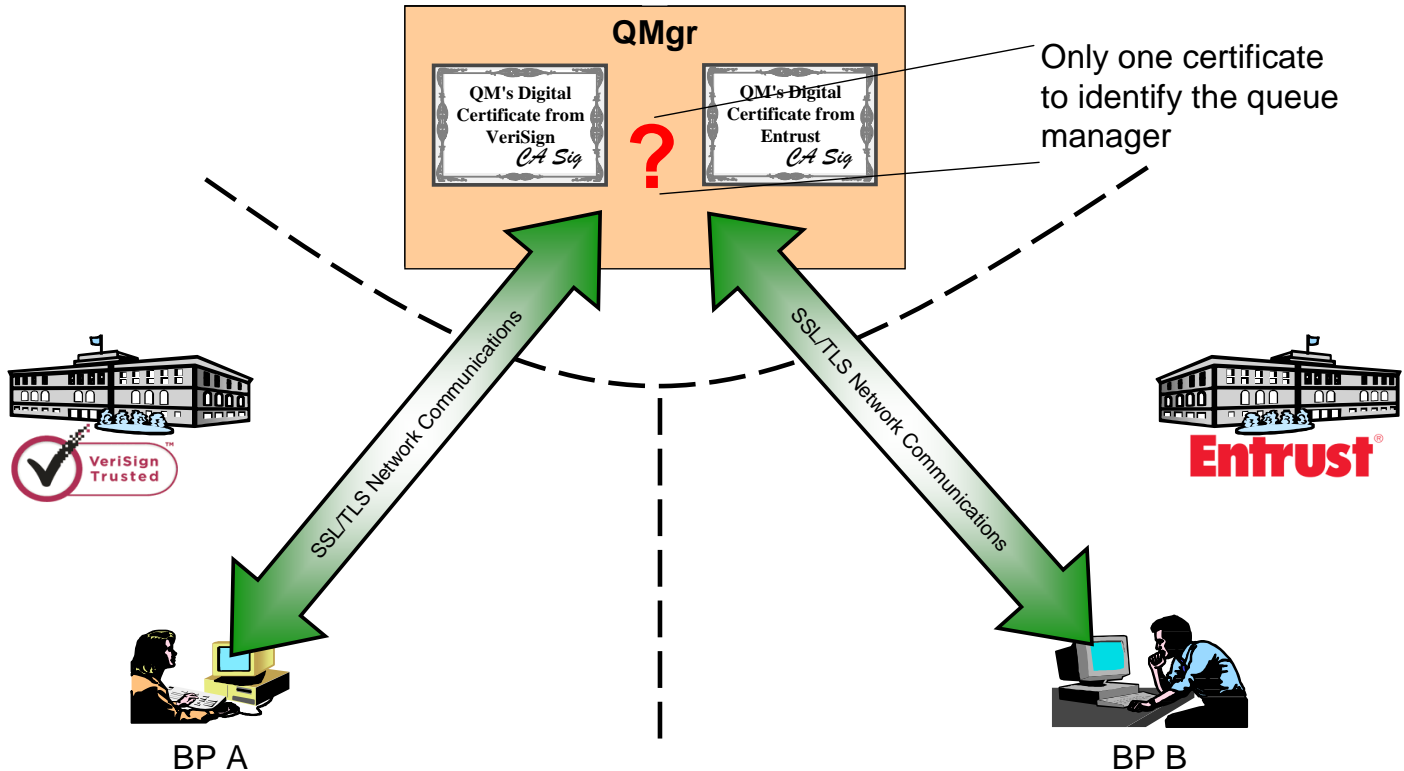
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- Here we list some of the uses we can imagine for being able to label your own certificate instead of following the pattern mandated in the past by WebSphere MQ.
- It is worth highlighting here that the change over from using one certificate to another is now a task that can be accomplished by the MQ administrator alone, when he is ready. The job of installing the new certificate can be done at any prior point and labelled however you wish. That label does not now have to change in order to get the queue manager to use it, so it is just a task for the MQ administrator to tell the queue manager which label to use now, and then refresh.



## Business Partners with different CA requirements



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## Business Partners with different CA requirements – Notes

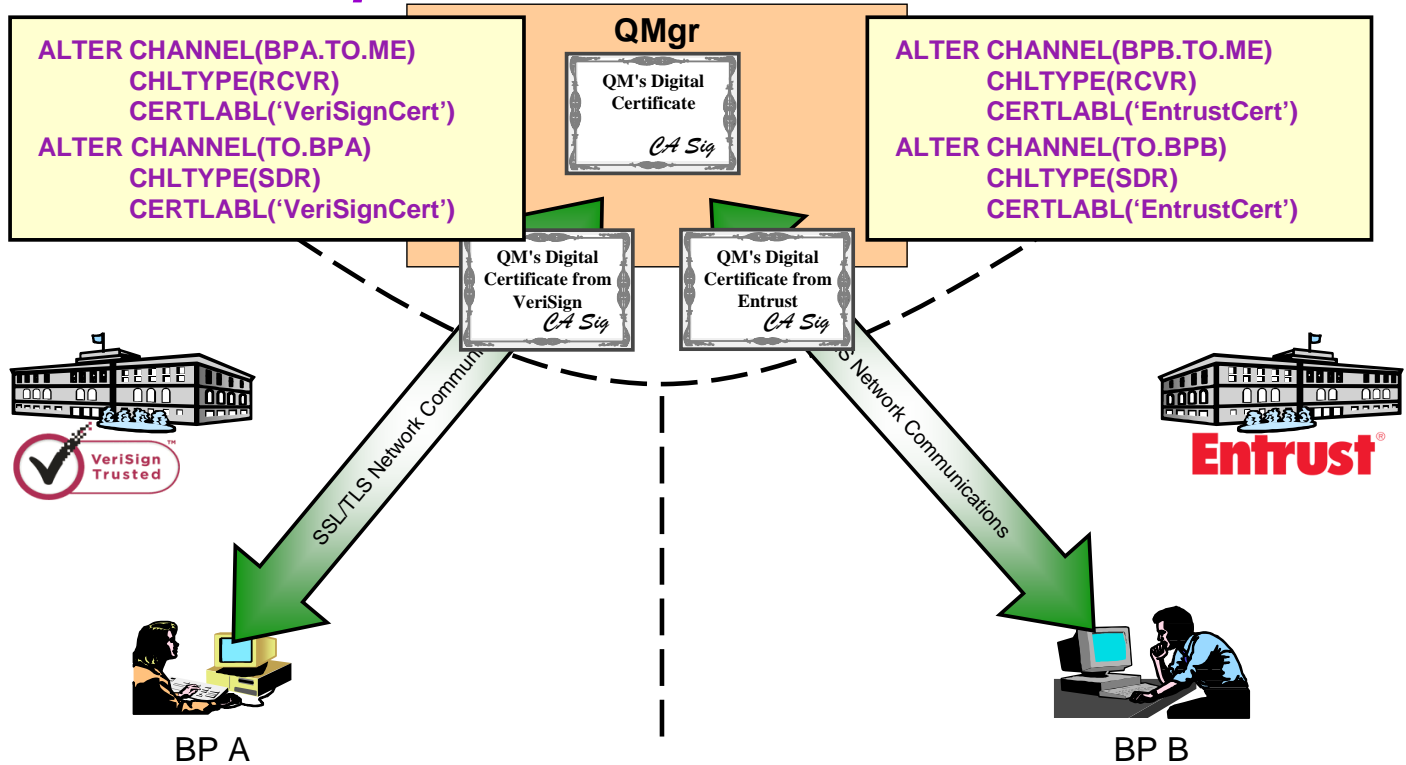
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- Imagine the situation where your company has need to communicate securely with two difference business partners. These business partners each have a different requirement about the Certificate Authority (CA) who signs the certificates that they are happy to accept. In our example, Business Partner A will only accept certificates signed by VeriSign, whereas Business Partner B will only accept certificates signed by Entrust.
- In order for your company to be able to communicate with both of these Business Partners, you need a certificate that is signed by VeriSign (to communicate with Business Partner A) and a certificate that is signed by Entrust (to communicate with Business Partner B). However, since a queue manager can only have one certificate, with releases prior to V8 of WebSphere MQ, you were forced into having two queue managers, one using each certificate. This is less than ideal.
- N.B. Some people also solve this issue by using an MQIPT in front of the queue manager.

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## Certificate per Channel



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## Certificate per Channel – Notes

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- What is required is the ability to indicate that this particular channel should use a different certificate than other channels.
- This is achieved in WebSphere MQ V8 with an attribute on a channel, CERTLABL, which can either be blank – which means use whatever the queue manager overall is configured to use, or if provided, means that this channel should use the specifically named certificate.
- For reasons explained a little later on, we only allow you to specify a non blank CERTLABL at definition time if you are using a TLS cipherspec.

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## Use Cases

- **Business Partners with different CA requirements**
- **Connecting to machines with back level SSL support**
  - ▶ Especially when you want to move to new certificate technology, e.g.
    - SHA-2 signed certificates
    - Elliptic Curve certificates

## Use Cases – Notes

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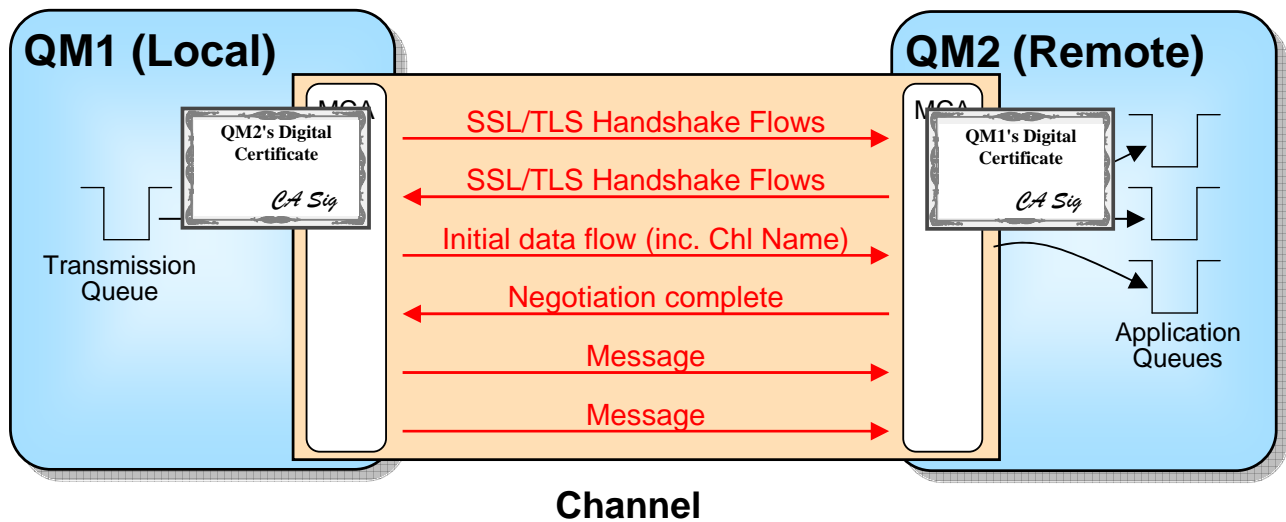
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- Here we list some of the uses we can imagine for being able to use a certificate per channel instead of just one for the whole queue manager.

## Why haven't we always done this?



## Why haven't we always done this? – Notes

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- The SSL/TLS handshake is done as the first thing on a channel, before any of the internal channel FAP flows. If you have ever pointed a web-browser with a https:// address at your MQ listener port, you'll know this. This means that the certificate is authenticated long before the channel name at the receiver end is known. This made it impossible to choose a certificate to be used for a receiver based on the channel name. The best that could have been done would have been to provide a different certificate per port number and have several different listeners running, each presenting a different certificate.
- Over time however, as SSL/TLS is used by more and more consolidated servers, think HTTP server farms and large application servers, it has become necessary to be able to separate the traffic that is going to a single server into differently authenticated groups.
- Enhancements to the TLS protocol allow the provision of information as part of the TLS handshake which can then be used to determine which certificate should be used for this particular connection.
- This enhancement is known as Server Name Indication (SNI).

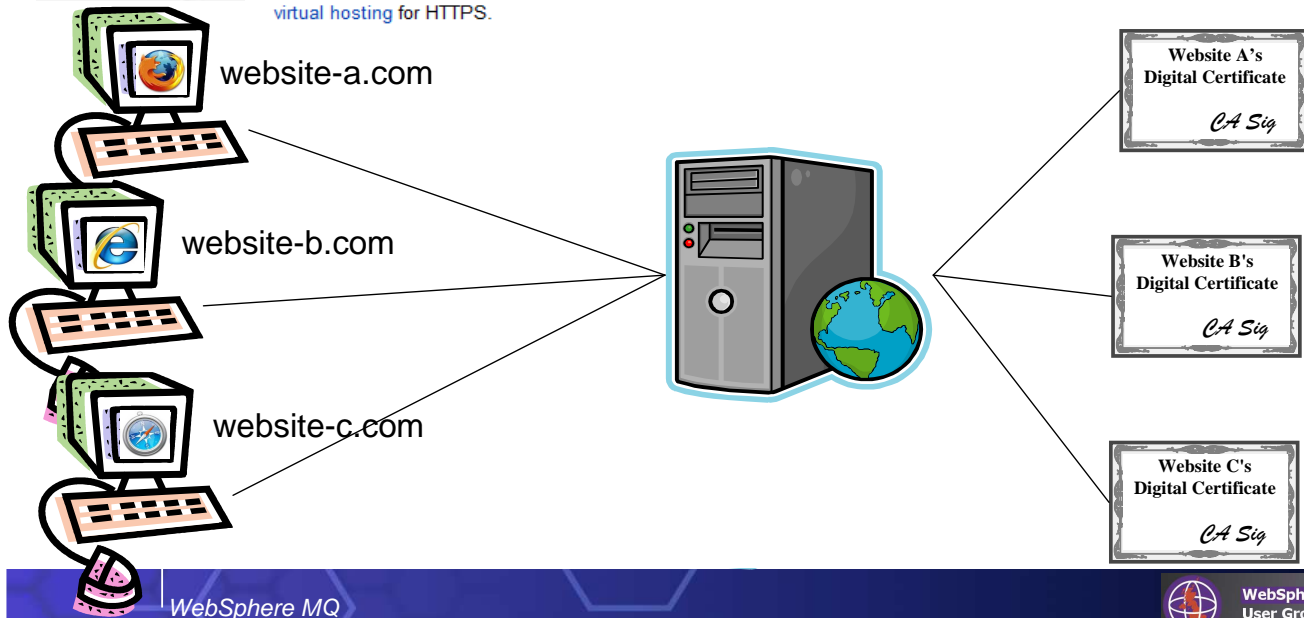
# Server Name Indication



## Server Name Indication

From Wikipedia, the free encyclopedia

**Server Name Indication (SNI)** is an extension to the [TLS protocol](#)<sup>[1]</sup> that indicates what hostname the client is attempting to connect to at the start of the handshaking process. This allows a server to present multiple certificates on the same IP address and port number and hence allows multiple secure ([HTTPS](#)) websites (or any other [Service](#) over TLS) to be served off the same IP address without requiring all those sites to use the same certificate. It is the conceptual equivalent to [HTTP/1.1 virtual hosting](#) for HTTPS.

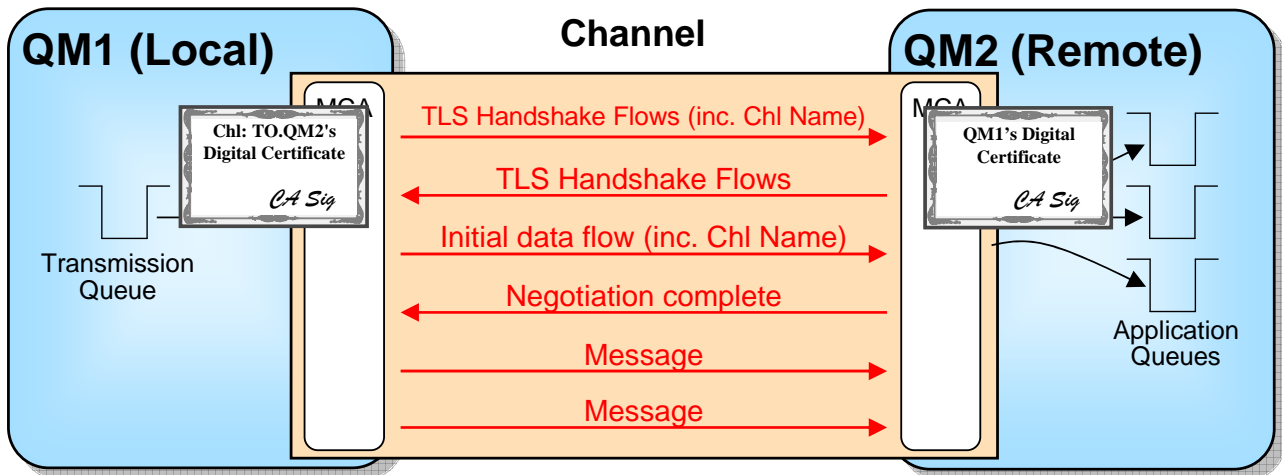


# Server Name Indication – Notes

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- Wikipedia provides a succinct summary of what Server Name Indication (SNI) is.
- The example on this page shows a use case where SNI would be used. We have three websites which each have their own certificate. When they were hosted on individual servers, then this was no problem, each web server has one certificate.
- Now let's think about what happens if we decide to consolidate those web sites onto a single server. How can we maintain the certificate correlation with the website. SNI allows this to be able to happen by providing a place in the TLS handshake for additional data to be flowed. This additional data is the hostname the browser was trying to connect to, thus allowing the certificate to be chosen based off that hostname.

## Using Server Name Indication (SNI) with a channel name



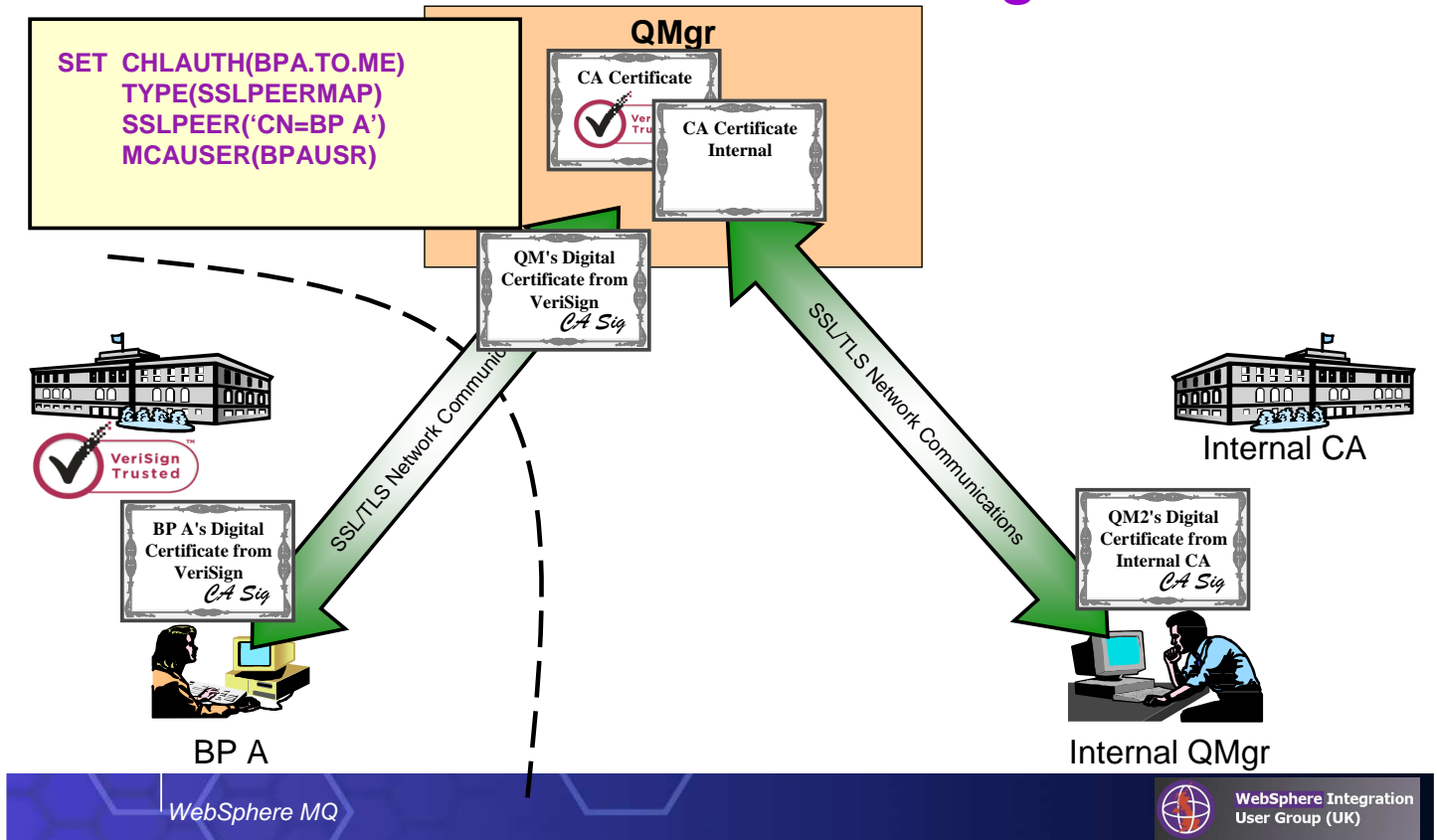
- Both ends of the channel must be at the new release
- Only TLS can be used, no SSL
  - Only certain cipherspecs will be able to supply this behaviour
- JSSE doesn't yet support SNI
  - So Java client can't make use of it
- If old sender/client used, we'd only detect that we needed to supply a different certificate after completion of the handshake and will fail the connection, if it hasn't already failed due to using the wrong certificate!

## Using Server Name Indication (SNI) with a channel name

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- WebSphere MQ V8 uses SNI to provide a channel name instead of a hostname. The sender (or client) end of the channel has been enhanced to put the channel name into the Server Name Indication (SNI) hint for the TLS Handshake.
- The receiver (or server-conn) end of the channel has been enhanced to retrieve the channel name from the SNI hint and select the appropriate certificate based on that information. It is worth noting that the channel name is now flowing in the clear, although in a tamper-proof manner.
- There are some restrictions to using this feature as listed.
- A back-level queue manager upon receiving a TLS handshake containing SNI, will just ignore what is in the SNI (as it is defined as an optional extension) and use the normal certificate.
- If there are no channels defined on the queue manager with anything in the CERTLABL field, then SNI will not be used by the receiving end. This will leave the behaviour the same as prior releases for certificate selection.

## Our Business Partner Scenario again

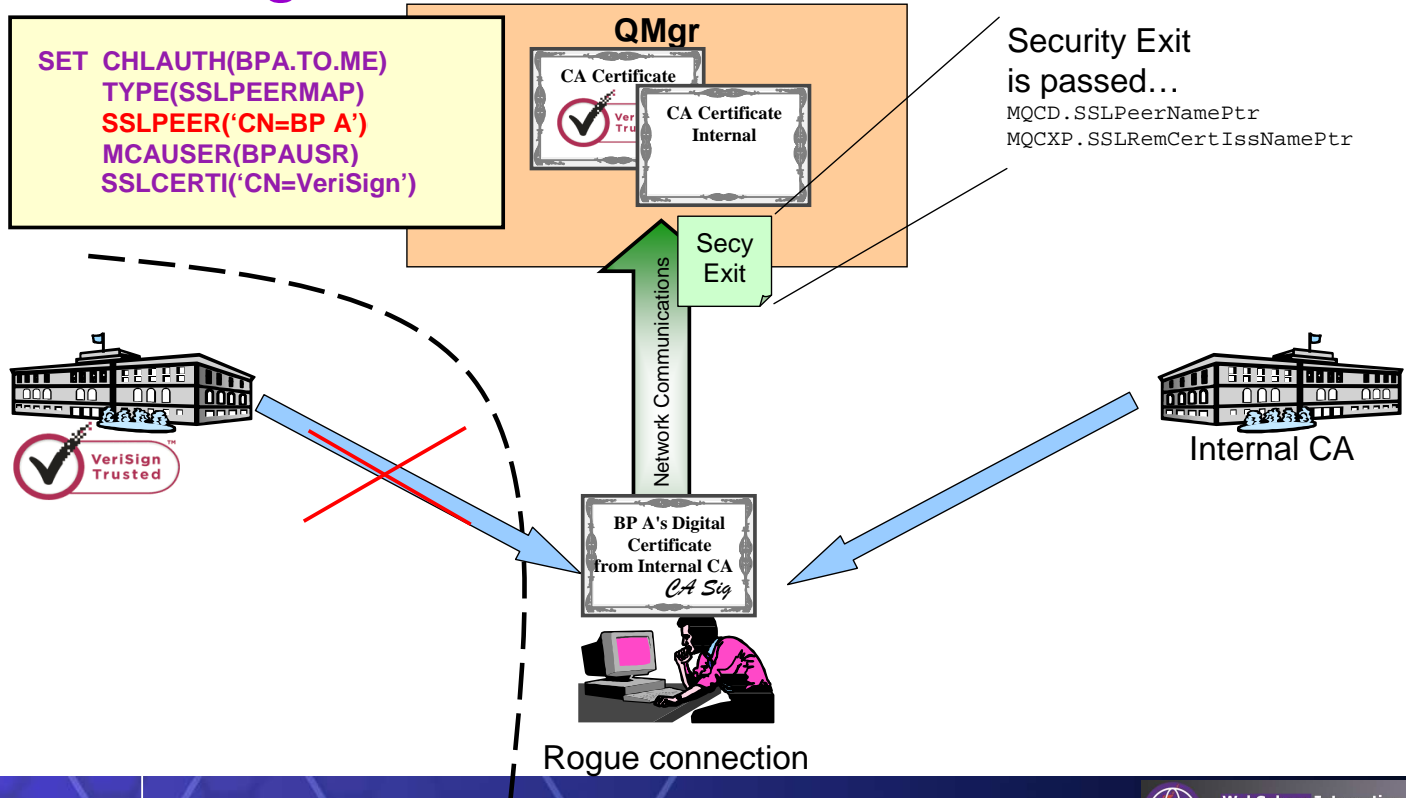


## Our Business Partner Scenario again – Notes

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- Let's look again at the business partner scenario again, but this time a little different, with one external CA and one internal CA.
- We've got the system set up so that we're using a Verisign certificate when talking to Business Partner A, and for the rest of our connections we have certificates created by our Internal CA. We've even got CHLAUTH rules in place to ensure that they are only allowed to connect to the queue manager over their appropriate channel.

## Ensuring the Correct Certificate



## Ensuring the Correct Certificate – Notes

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- However, since we now accept certificates which come from two different Certificate Authorities (CAs) we can run foul of another issue.
- One of the benefits of CAs is that they guarantee not to issue the certificates with the same DN as another certificate that they have already issued. So a rogue connection could not obtain a certificate with the same DN as Business Partner A from VeriSign, because VeriSign has already issued one with that DN. Also, one would expect external CA's to do a few more checks than that and not issue certificates with other people's company names in them to people not from that company. However, an internal CA may not be so diligent. Some internal CAs may simply accept what the user requests as their DN, so our rogue could obtain a certificate with Business Partner A's DN from such a CA.
- The only way to solve this issue in the past was to use a security exit, since security exits are presented with both the issuer's and subject's Distinguished Name. However, we are trying to get away from people having to write exits for common security issues, and this very much falls into that category.
- In WebSphere MQ V8, we can solve this issue by using a new attribute on CHLAUTH rules which matches the issuer's DN – SSLCERTI. Our CHLAUTH rules can now be fully qualified to use both SSLPEER (the subject's DN) and SSLCERTI (the issuer's DN).



# Summary

## ■ Changes for Channels using SSL/TLS Certificates

### ▶ Single Queue Manager Certificate

- `ALTER QMGR CERTLABL('My certificate name')`

### ▶ Per Channel Certificate

- `ALTER CHANNEL ... CERTLABL('This channel certificate')`

### ▶ Certificate Matching

- `SET CHLAUTH(' * ')`  
`TYPE(SSLPEERMAP)`  
`SSLPEER('CN=Morag Hughson')`  
`SSLCERTI('CN=IBM CA')`  
`MCAUSER('hughson')`



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# Questions?



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# User ID & Password Connection Authentication

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## Agenda

- Requests for Enhancement
- Connection Authentication
  - ▶ Configuration
  - ▶ Application Changes (or not)
  - ▶ Protecting your password across a network
  - ▶ User Repositories

## Request for Enhancement (22568)



**Headline:** Password validation

**ID:** 22568

[Details](#) | [Comments](#) | [Attachments](#) | [Reconsideration](#) | [Release plans](#)

**Status:** [Uncommitted Candidate](#)

**Visibility:** Public

**Description:** Password validation of Client connections to be delivered for all platforms. CSQ4BCX3 is supplied for z/OS. We need the similar functionality for various platforms (Windows, Linux, AIX, Solaris, HP-NSK). This would help us to prove to audit that we know who is connecting.

**Use case:** Ease a secure integration with MO71 and MQ Explorer, so we can please law and audit teams. This will remove the need for using SSL to assure the identity of MQ administrators.

**Bookmarkable URL:** [http://www.ibm.com/developerworks/rfe/execute?use\\_case=viewRfe&CR\\_ID=22568](http://www.ibm.com/developerworks/rfe/execute?use_case=viewRfe&CR_ID=22568)  
A unique URL that you can bookmark and share with others.



## Request for Enhancement (30709)



**Headline:** WMQ Authentication via LDAP

**ID:** 30709

[Details](#) | [Comments](#) | [Attachments](#) | [Reconsideration](#) | [Release plans](#)

**Status:** [Uncommitted Candidate](#)

**Visibility:** Public

**Description:** Authenticate client connections with a central LDAP server. Instead of using the O/S for authentication we would like to be able to hand off a user/password combination to an LDAP server for authentication.

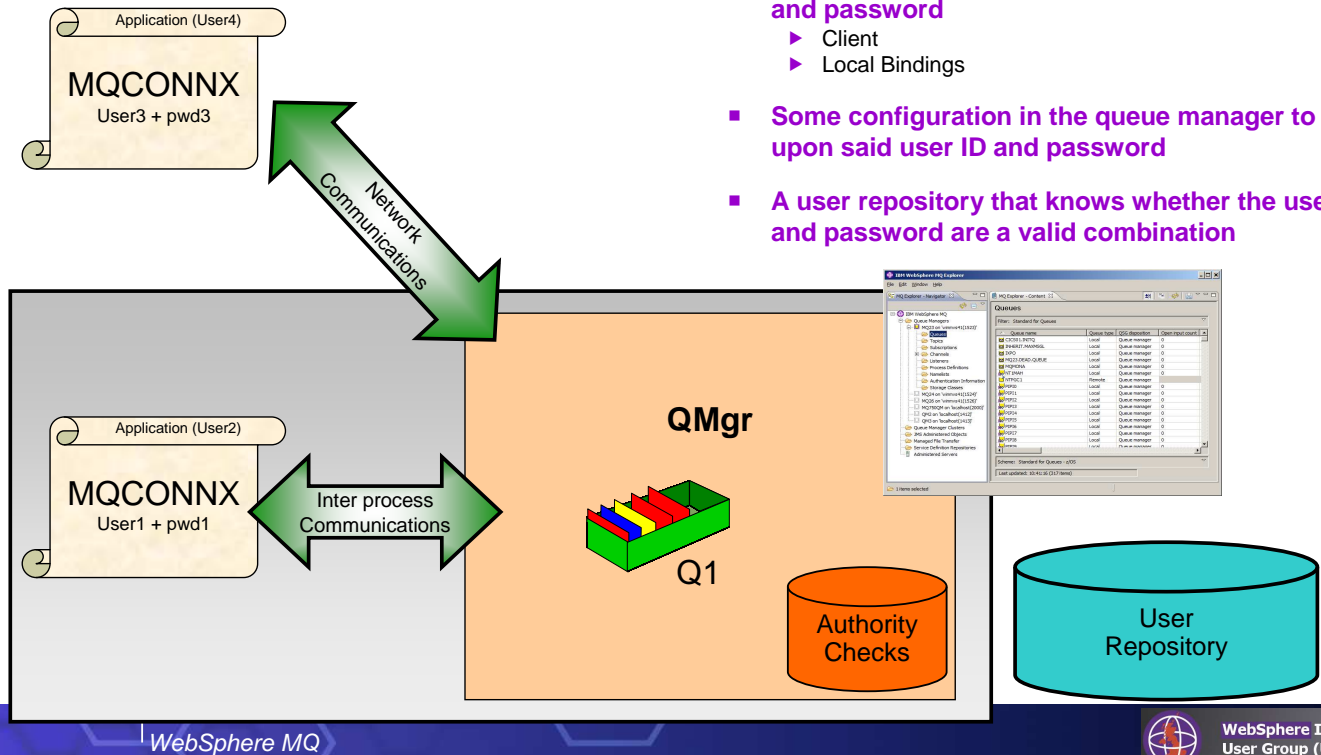
**Use case:** Clients would supply a user/password for authentication that would be validated by a central LDAP server, authorisation could be handled in the existing manner. The LDAP authentication could occur over SSL or plain TCP.

**Bookmarkable URL:** [http://www.ibm.com/developerworks/rfe/execute?use\\_case=viewRfe&CR\\_ID=30709](http://www.ibm.com/developerworks/rfe/execute?use_case=viewRfe&CR_ID=30709)  
A unique URL that you can bookmark and share with others.



# Connection Authentication – What is it?

- The ability for an application to provide a user ID and password
  - ▶ Client
  - ▶ Local Bindings
- Some configuration in the queue manager to act upon said user ID and password
- A user repository that knows whether the user ID and password are a valid combination



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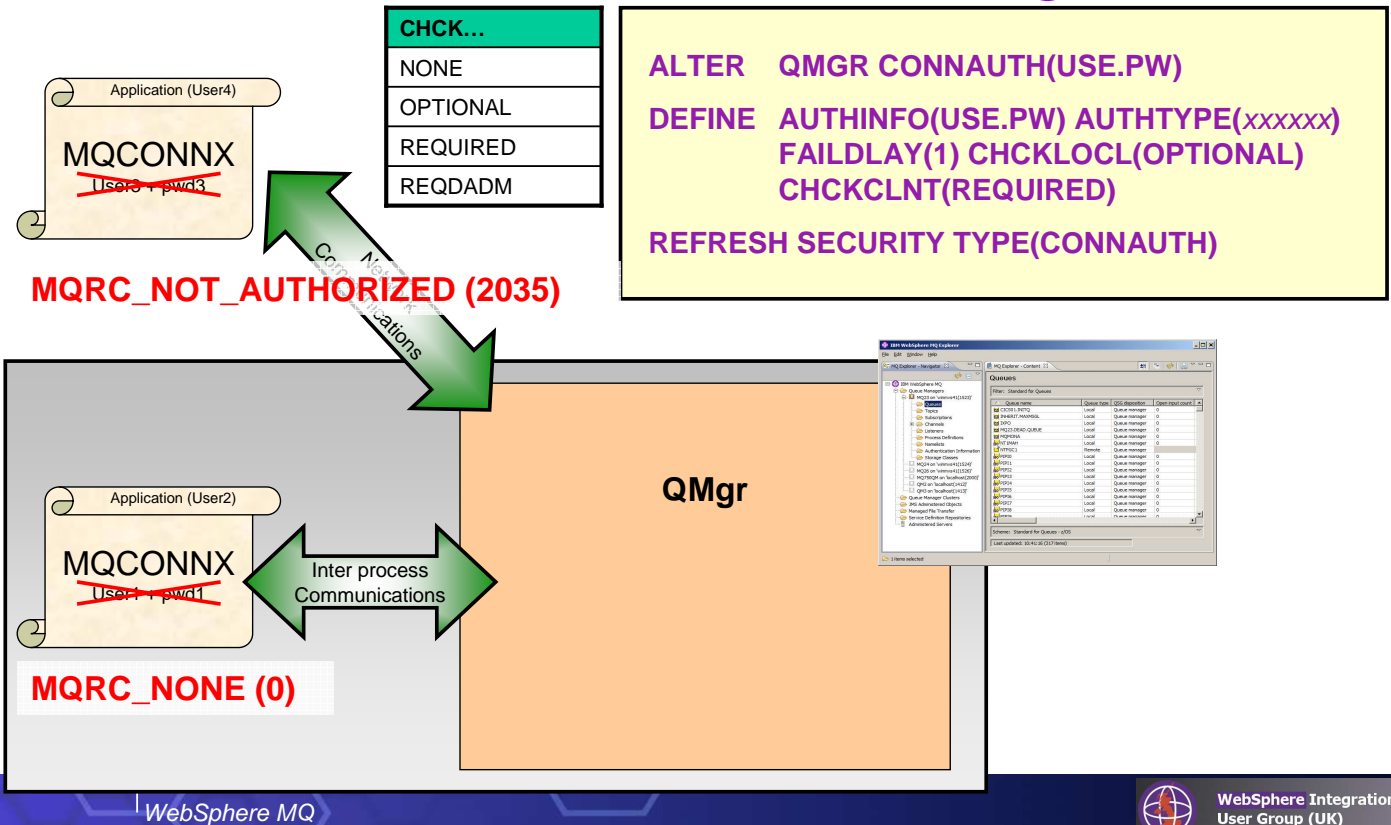
## Connection Authentication – What is it? – Notes

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- This picture shows the landscape we're going to use to discuss various patterns and then the changes in WebSphere MQ V8 in order to support these patterns. Just to ensure everyone is familiar with the parts on the diagram we'll briefly look at them first from left to right.
  - On the left of this picture we see applications making connections, one as a client and one using local bindings. These applications could be using a variety of different APIs to connect to the queue manager, but all have the ability to provide a user ID and a password. The user ID that the application is running under (the classic user ID presented to WebSphere MQ) may be different from the user ID provided by the application along with its password, so we illustrate both on the diagram.
  - In the middle we have a queue manager with configuration commands and managing the opening of resources and the checking of authority to those resources. There are lots of different resources in WebSphere MQ that an application may require authority to, in this diagram we are just going to use the example of opening a queue for output, but the same applies to all others.
  - On the right we have a representation of a user repository – i.e. containing user IDs and passwords, more on this later.

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# Connection Authentication – Configuration



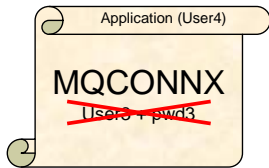
## Connection Authentication – Configuration – Notes

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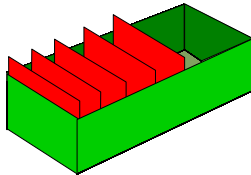
- We'll start with the basic configuration side of things. How do I turn on this connection authentication feature on the queue manager.
- On the queue manager object there is a new attribute called CONNAUTH (short for connection authentication) which points to an object name. The object name it refers to is an authentication information object – one of two new types. There are two existing types of authentication information objects from earlier releases of WebSphere MQ, these original two types cannot be used in the CONNAUTH field.
- The two new types are similar in quite a few of the basic attributes so we will look at those first. We'll come back to more of the attributes later. We show here a new authentication information object which has two fields to turn on user ID and password checking, CHCKLOCL (Check Local connections) and CHCKCLNT (Check Client connections). Changes to the configuration of this must be refreshed for the queue manager to pick them up.
- Both of these fields have the same set of attributes, allowing for a strictness of checking. You can switch it off entirely with NONE; set it to OPTIONAL to ensure that if a user ID and password are provided by an application then they must be a valid pair, but that it is not mandatory to provide them – a useful migration setting perhaps; set it to REQUIRED to mandate that all applications provide a user ID and password; and, only on Distributed, REQDADM which says that privileged users must supply a valid user ID and password, but non-privileged users are treated as per the OPTIONAL setting.
- Any application that does not supply a user ID and password when required to, or supplies an incorrect combination even when it is optional will be told 2035 (MQRC\_NOT\_AUTHORIZED). N.B. When password checking is turned off using NONE – then invalid passwords will not be detected.
- Any failed authentications will be held for the number of seconds in the FAILDLAY attribute before the error is returned to the application – just some protection against a busy loop from an application repeatedly connecting.



## Connection Authentication – Error notification



**MQRC\_NOT\_AUTHORIZED (2035)**



**SYSTEM.ADMIN.QMGR.EVENT**

**ALTER QMGR AUTHOREV(ENABLED)**

### ■ Application

- ▶ MQRC\_NOT\_AUTHORIZED (2035)

### ■ Administrator

- ▶ Error message

### ■ Monitoring Tool

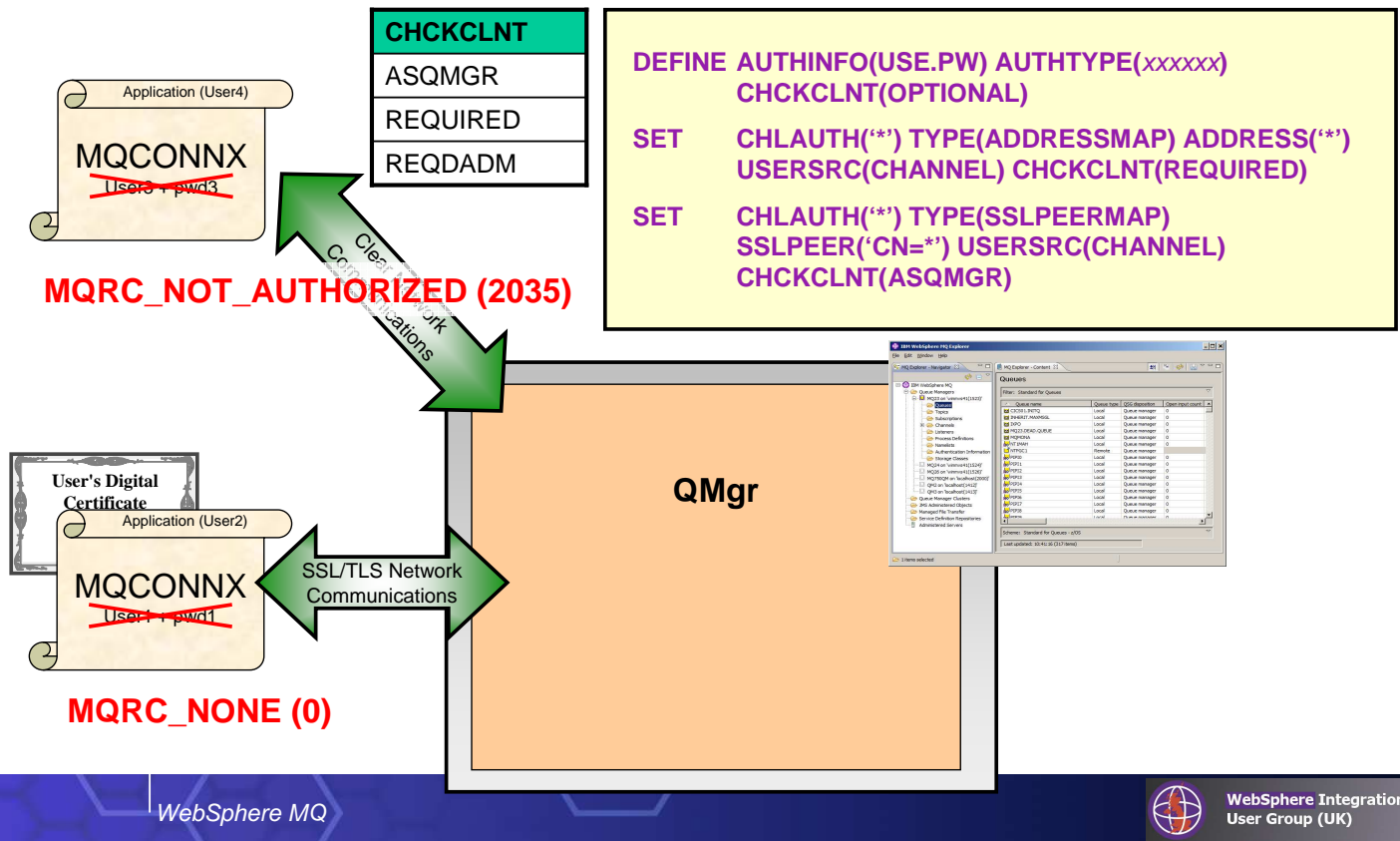
- ▶ Not Authorized Event message (Type 1 – Connect)
- ▶ MQRQ\_CONN\_NOT\_AUTHORIZED (existing)
  - Connection not authorized.
- ▶ MQRQ\_CSP\_NOT\_AUTHORIZED (new)
  - User ID and password not authorized.
- ▶ Additional field to existing connect event
  - MQCACF\_CSP\_USER\_IDENTIFIER

## Connection Authentication – Error notification – Notes

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- When an application provides a user ID and password which fail the password check, the application is returned the standard MQ security error, 2035 – MQRC\_NOT\_AUTHORIZED.
- The MQ administrator will see this reported in the error log and can therefore see that the application was rejected due to the user ID and password failing the check, rather than, for example, a lack of connection authority (+connect).
- A monitoring tool can also be notified of this failure if authority events are on - ALTER QMGR AUTHOREV(ENABLED) – via an event message to the SYSTEM.ADMIN.QMGR.EVENT queue. This Not Authorized event is a Type 1 – Connect – event and provides all the same fields as the existing Type 1 event, along with one, additional field, the MQCSP user ID provided. The password is not provided in the event message. This means that there are two user IDs in the event message, the one the application is running as and the one the application presented for user ID and password checking.

## Connection Authentication – Configuration Granularity

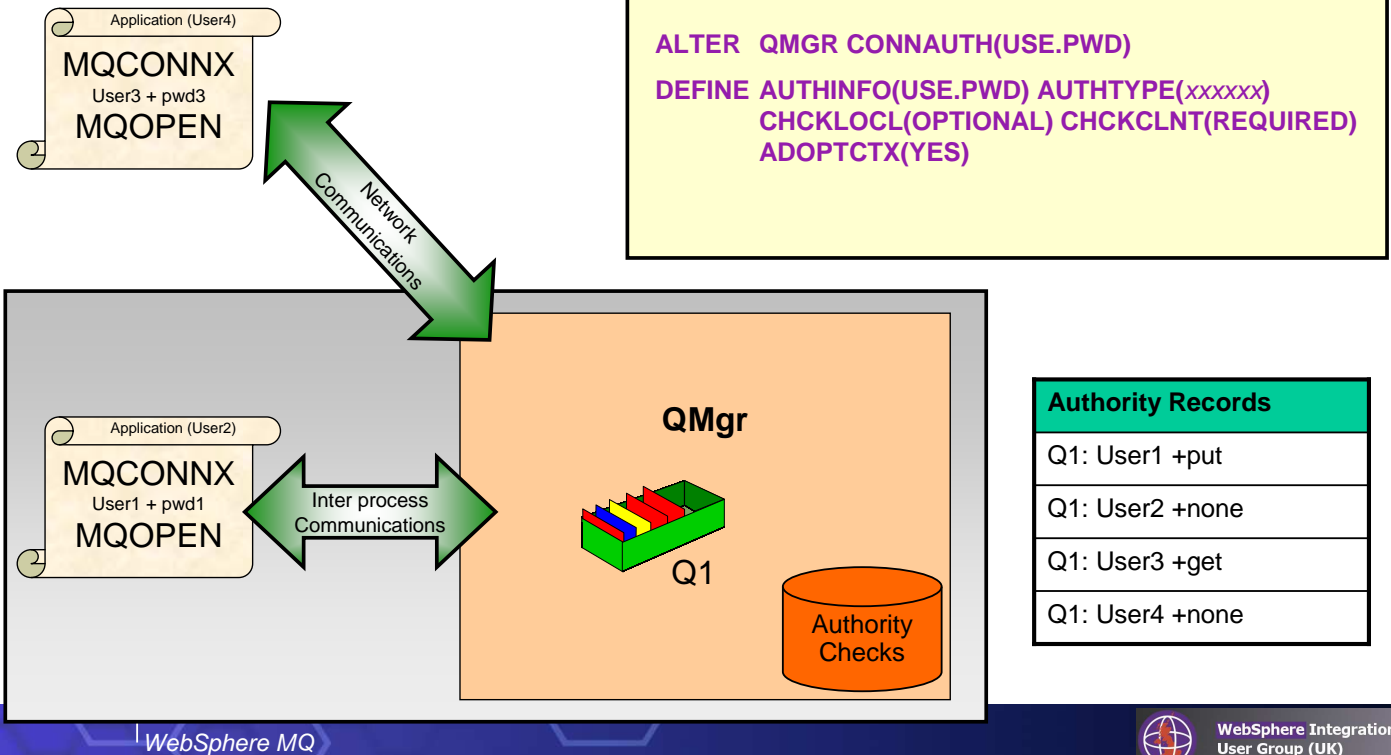


## Connection Authentication – Configuration Granularity – Notes

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- In addition to the two fields that turn this on overall for client and locally bound applications, there are enhancements to the CHLAUTH rules so that more specific configuration can be made using CHCKCLNT. You can set the overall CHCKCLNT value to OPTIONAL, and then upgrade it to be more stringent for certain channels by setting CHCKCLNT to REQUIRED or REQDADM on the CHLAUTH rule. By default, CHLAUTH rules will run with CHCKCLNT(ASQMGR) so this granularity does not have to be used.

## Connection Authentication – Relationship to Authorization



## Connection Authentication – Relationship to Authorization – Notes

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- So we have seen that we can configure our queue manager to mandate user IDs and passwords are provided by certain applications. We know that the user ID that the application is running under may not be the same user ID that was presented by the application along with a password. So what is the relationship of these user IDs to the ones used for the authorization checks when the application, for example, opens a queue for output.
- There are two choices, in fact, controlled by an attribute on the authentication information object – ADOPTCTX.
- You can choose to have applications provide a user ID and password for the purposes of authenticating them at connection time, but then have them continue to use the user ID that they are running under for authorization checks. This may be a useful stepping stone when migrating, or even a desirable mode to run in, perhaps with client connections, because authorization checks are being done using an assigned MCAUSER based on IP address or SSL/TLS certificate information.
- Alternatively, you can choose the applications to have all subsequent authorization checks made under the user ID that you authenticated by password by selecting to adopt the context as the applications context for the rest of the life of the connection.
- If the user ID presented for authentication by password is the same user ID that the application is also running under, then of course this setting has no effect.

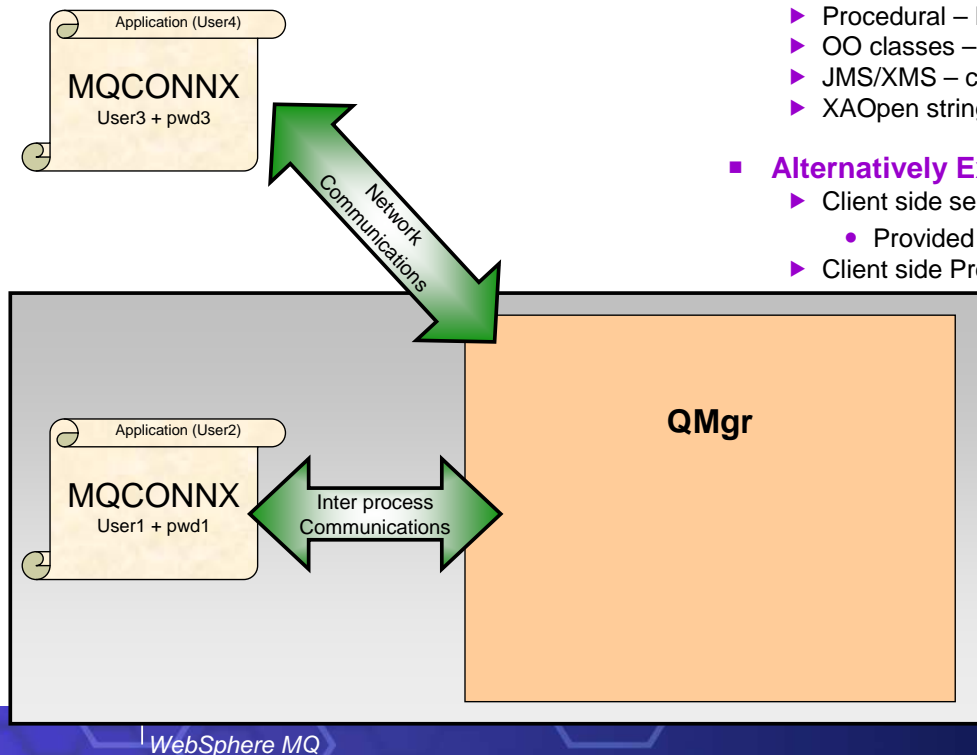
## Connection Authentication – Application changes

### Code changes

- ▶ Procedural – MQCSP on MQCONN
- ▶ OO classes – MQEnvironment
- ▶ JMS/XMS – createConnection
- ▶ XAOpen string

### Alternatively Exits can provide MQCSP

- ▶ Client side security exit
  - Provided
- ▶ Client side Pre-conn exit



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## Connection Authentication – Application changes – Notes

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- Since WebSphere MQ V6.0, an application has been able to provide a user ID and password (in the Connection Security Parameters (MQCSP) structure in the MQCNO) at MQCONN time. These were passed to a user written plug-point in the OAM on distributed to be checked. If the application was running client bound, this user ID and password were also passed to the client side and server side security exits for processing and can be used for setting the MCAUser attribute of a channel instance. The security exit is called with ExitReason MQXR\_SEC\_PARMS for this processing.
- This pre-existing feature of the MQI is being used to provide the user ID and password to the queue manager for checking. Previously a custom Authorization Service was required to check this (or a security exit if the applications were connecting as clients), now the Object Authority Manager (OAM) supplied with the queue manager and the z/OS Security component within the queue manager will deal with these user IDs and passwords. Whether z/OS or distributed, the component that deals with the user IDs and passwords will call out to a facility outside of MQ to do the check – more on that later.
- In WebSphere MQ V8 this will be available in all our interfaces listed, even where some of those were not made available in the WebSphere MQ V6 timeframe when the programming interface was originally provided.
- In prior releases the MQCSP had no architected limits on the user ID and password strings that were provided by the application. When using them with these MQ provided features there are limits which apply to the use of these features, but if you are only passing them to your own exits, those limits do not apply.
- The XAOpen string has also been updated to allow the provision of a user ID and password.
- Sometimes of course, it can be hard to get changes into applications, so the user ID and password can be provided using an exit instead of changing the code. Client side security exits or the pre-connect exit, can make changes to the MQCONN before it is sent to the queue manager, and the security exit in fact is designed to allow the setting of the MQCSP since V6 (so clients do not need to be updated to the new version in order to use this).

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## Procedural MQI changes

- **MQCSP structure**
  - ▶ Connection Security Parameters
  - ▶ User ID and password
- **MQCNO structure**
  - ▶ Connection Options
- **WebSphere MQ V6**
  - ▶ Passed to OAM (Dist only)
  - ▶ Also passed to Security Exit
    - Both z/OS and Distributed
    - MQXR\_SEC\_PARMS
- **WebSphere MQ V8**
  - ▶ Acted upon by the queue manager (all platforms)

```
MQCNO cno = {MQCNO_DEFAULT};

cno.Version = MQCNO_VERSION_5;

cno.SecurityParmsPtr = &csp;

MQCONN(X, QMName,
        &cno,
        &hConn,
        &CompCode,
        &Reason);
```

```
MQCSP csp = {MQCSP_DEFAULT};

csp.AuthenticationType = MQCSP_AUTH_USER_ID_AND_PWD;
csp.CSPUserIdPtr       = "hughson";
csp.CSPUserIdLength    = 7;           /* Max: MQ_CLIENT_USER_ID_LENGTH */
csp.CSPPasswordPtr     = "passw0rd";
csp.CSPPasswordLength  = 8;           /* Max: MQ_CSP_PASSWORD_LENGTH */
```

## Object Oriented MQ classes changes

```
MQEnvironment.properties = new Hashtable();
MQEnvironment.userID     = "hughson";
MQEnvironment.password   = "passw0rd";

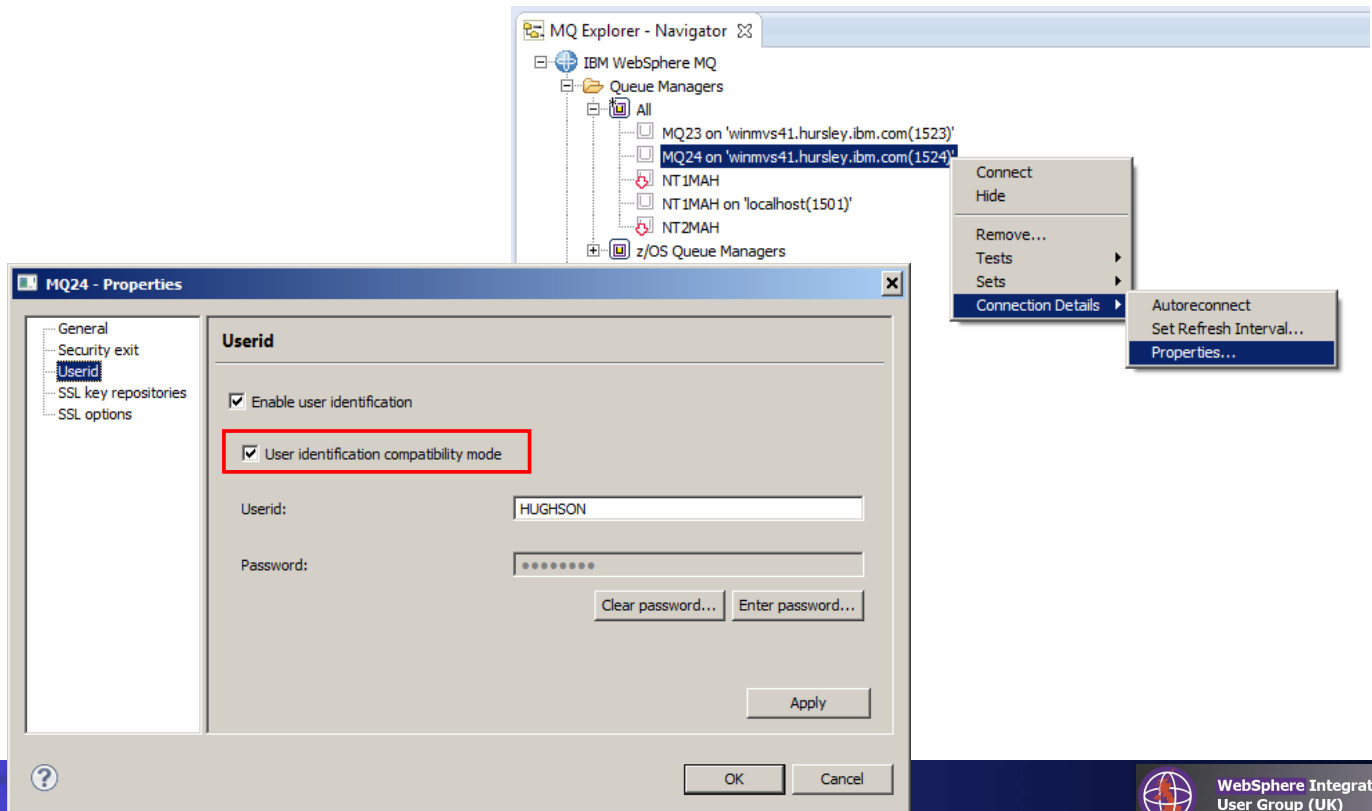
System.out.println("Connecting to queue manager");
MQQueueManager qMgr = new MQQueueManager(QMName);
```

## JMS/XMS classes changes

```
cf = getCF();

System.out.println("Creating the Connection with UID and Password");
Connection conn = cf.createConnection("hughson", "passw0rd");
```

## Using it from the MQ Explorer GUI



## Using it from the MQ Explorer GUI – Notes

NOTES

- The WebSphere MQ Explorer GUI is an MQ Java™ application, so since there is a programming interface for MQ Java to supply a user ID and password, the Explorer GUI can use this.
- To configure the Explorer to use a user ID and password on a connection to a queue manager (whether local or client connection), select Connection Details->Properties... from the right-mouse context menu on the queue manager. In the dialog that appears, choose Userid. This panel is the same for both local or client connections in WebSphere MQ V8, although the Properties dialog will have less selections for other things in the local case.
- Explorer has a password cache which will need to be enabled in order to use passwords. If you have never used it before there will be a link on this panel to take you through it.
- The other interesting item here is the “User identification compatibility mode” check box. This is for those of you who have been using Security exits with the Explorer in the past. The Java client previously did not use the MQCSP structure to supply its user ID and password in previous releases, and there are many exits written that have discovered where the user ID and password were provided instead. In order to retain compatibility for this, the Java client has two modes. It can run in compatibility mode and maintain what you had before, or it can run with the V8 mode and use the MQCSP. The check box shown is how you set that property in the Explorer GUI. For other Java applications, you need to set property to indicate you are happy to use the MQCSP method.
- At the queue manager, if no MQCSP is sent by a client, but the user ID and password are provided in this alternate method that was utilised by Java Clients, the V8 queue manager will accept this and drive the same password check as is used for the MQCSP provided passwords.



## Client side Security Exit

### mqccred.ini

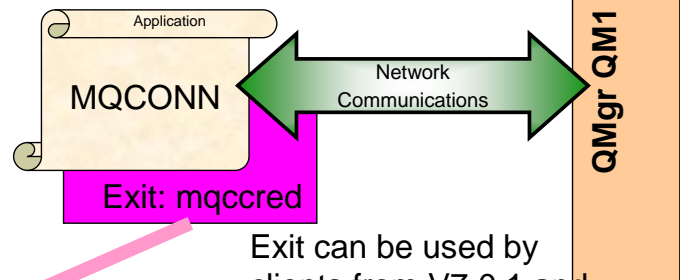
```
AllQueueManagers:
  User=abc
  password=newpw
QueueManager:
  Name=QMA
  User=user1
  password=passw0rd
```

Tool: runmqccred

### mqccred.ini

```
AllQueueManagers:
  User=abc
  OPW=%^&aervrgtser
QueueManager:
  Name=QM1
  User=user1
  OPW=H&^dbgfh
```

File  
permissions



Exit can be used by clients from V7.0.1 and later (by copying from a V8 installation)

## Client side Security Exit – Notes

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- To make changes to applications, especially the very prevalent client attached applications where we see the strongest use case for using user ID and password, is difficult for customers. To aid with this issue, WebSphere MQ V8 provides a client side security exit which can set the user ID and password instead of making changes in the application to do this.
- The exit runs at the CLNTCONN end of the channel and pulls the user ID and the password from a file. This file is controlled by means of OS file permissions. If the exit discovers that the file permissions are too open, it will cause a failure thus ensuring that this important part of protecting the passwords does not go unnoticed.
- The file is additionally obfuscated from casual browsers. The algorithm for this obfuscation is not published, and neither is the source of the exit.
- The exit will be built in such a way that it can be picked up from a V8 installation and copied to a V7.0.1 client installation (or later). Note that using a client installation of < V8 will mean you have the password flowed in the clear. Only V8 and later at both ends will provide the ability to protect the flowed password without the need to use SSL/TLS.
- Along with the exit, we also supply a tool which is used to obfuscate the file containing the passwords.

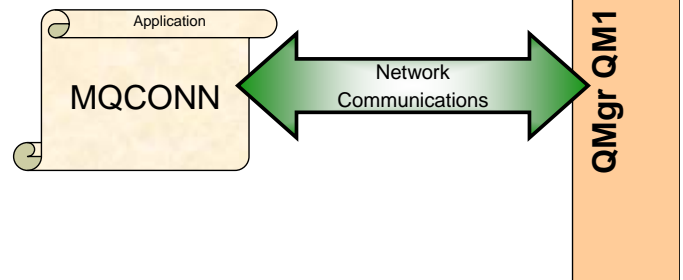
# Protecting your password across a network

## ■ Use SSL/TLS

- ▶ Perhaps with anonymous clients

## ■ If no SSL/TLS

- ▶ If both ends are V8
- ▶ MQ Code will protect the password – so not sent in the clear



## ■ If client is < V8

- ▶ No MQ password protection
- ▶ Consider SSL/TLS

# Protecting your password across a network – Notes

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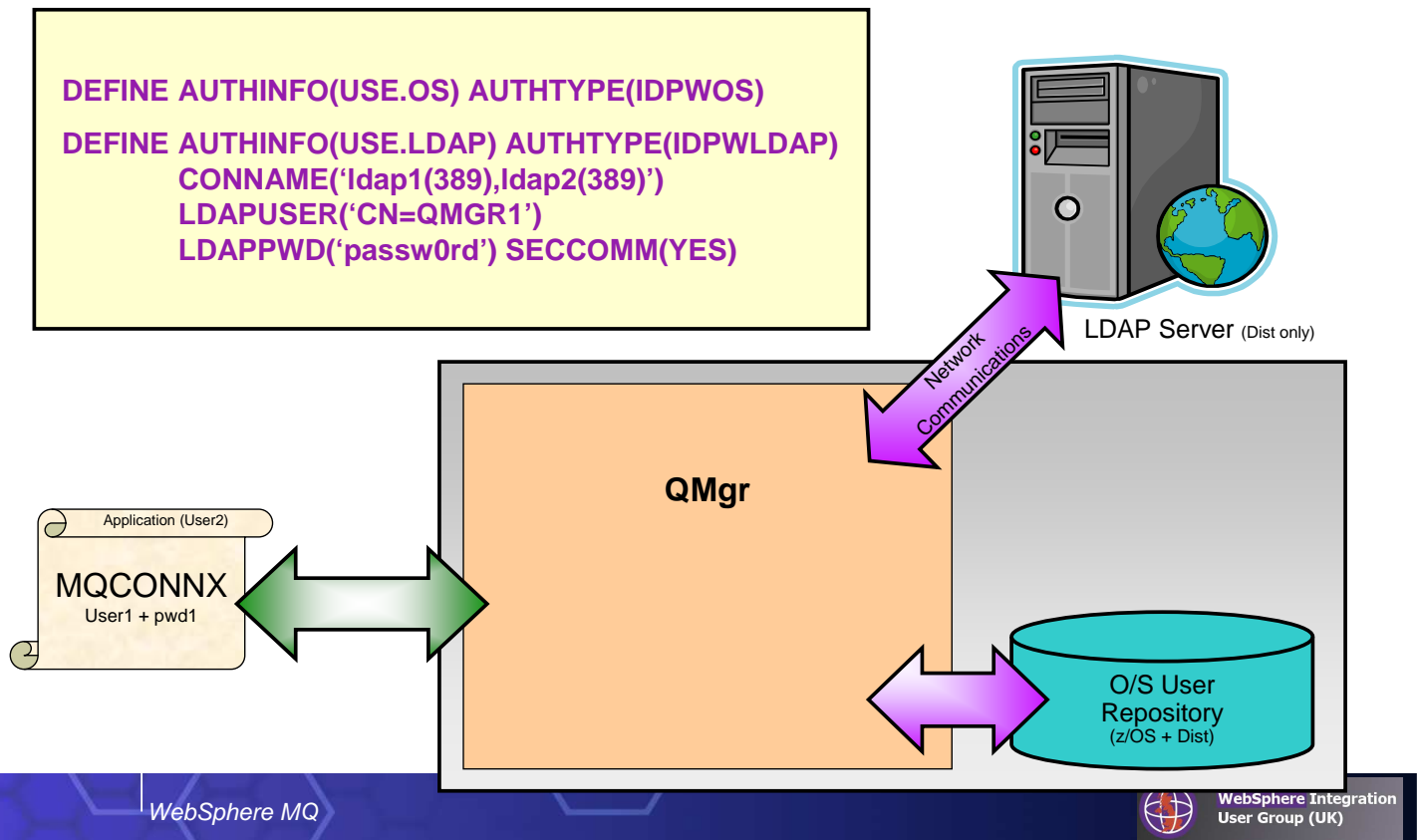
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- When an application connects to a WebSphere MQ V8 queue manager across the network, i.e. making a client connection, the password it sends for connection authentication purposes travels across the network from the client application to the queue manager for checking. This password should be protected as it does so, so that network sniffers cannot obtain your password.
- For best possible protection, you can of course use SSL/TLS. You might imagine using anonymous SSL/TLS, i.e. the client does not have a certificate, since you are using user ID and password as the means by which to verify the identity of the client application.
- If you do not use SSL/TLS, and your client is at V8.0 or later, the WebSphere MQ product code will protect your password so that it is not sent in the clear. A good reason to get your clients upgraded to V8!
- If your WebSphere MQ Client is at a version earlier than V8.0, it can still send user ID and passwords (since the MQCSP structure has been around since V6) but the password will not be protected, so you should consider using SSL/TLS.

## Connection Authentication – User

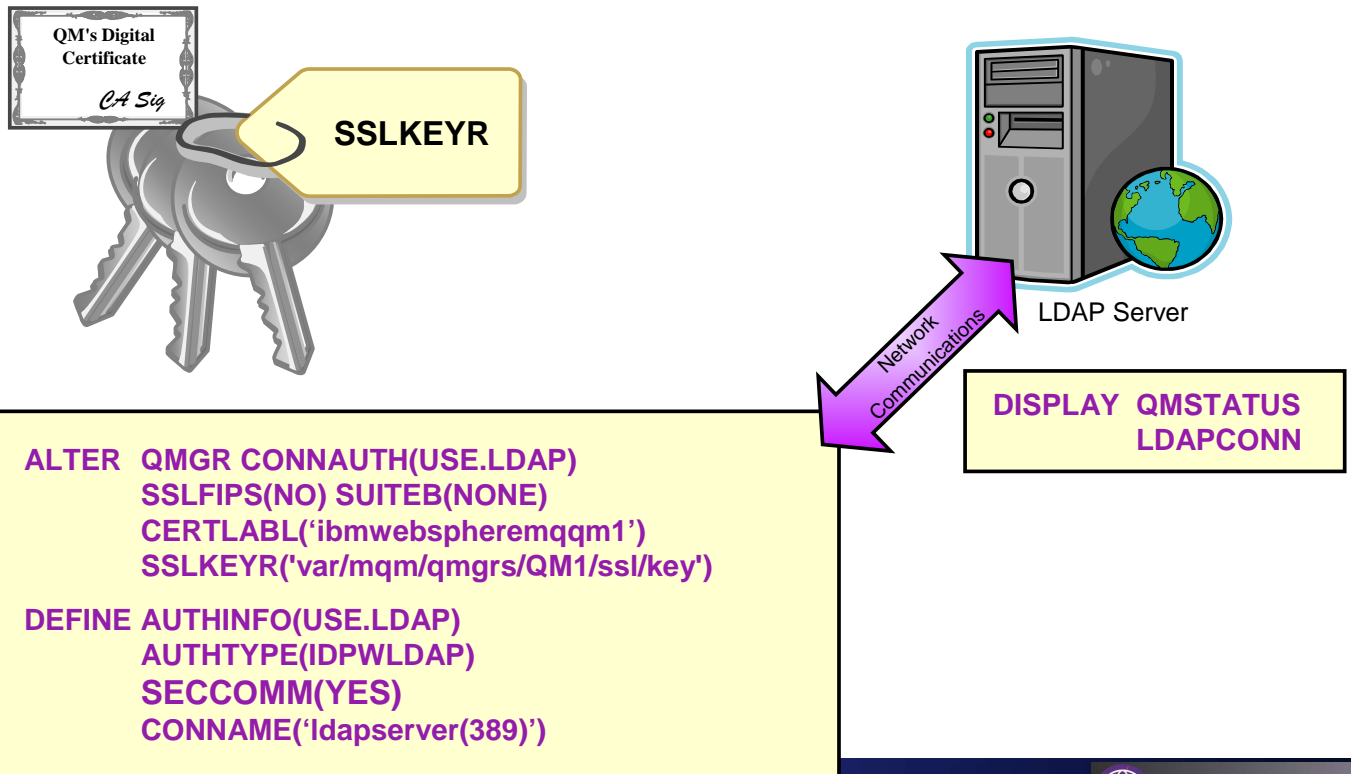


## Connection Authentication – User Repositories – Notes

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- So far we have spoken about user ID and password authentication without mentioning what is actually doing the authentication. We've also shown that there is a new type of authentication information object without showing you the object type. Here we introduce two new object types of authentication information objects.
- The first type is used to indicate that the queue manager is going to use the local O/S to authenticate the user ID and password. This type is IDPWOS.
- The second type is used to indicate that the queue manager is going to use an LDAP server to authenticate the user ID and password. This type is IDPWLDAP and is not applicable on z/OS.
- Only one type can be chosen for the queue manager to use by naming the appropriate authentication information object in the queue manager's CONNAUTH attribute.
- We have already covered everything there is to say about the configuration of the O/S as the user repository as the common attributes are all there is for the O/S. There is more to say about the LDAP server as an option though.
- Some of the LDAP server configuration attributes are probably fairly obvious. The CONNAME is how the queue manager knows where the LDAP server is, and SECCOMM controls whether connectivity to the LDAP server will be done using SSL/TLS or not. The LDAPUSER and LDAPPWD attributes are how the queue manager binds to the LDAP server so that it can look-up information about user records. It is likely this may be a public area of an LDAP server, so these attributes may not be needed.
- It is worth highlighting that the CONNAME field can be used to provide additional addresses to connect to for the LDAP server in a comma-separated list. This can aid with redundancy if the LDAP server does not provide such itself.

## Secure connection to an LDAP Server



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## Secure connection to an LDAP Server – Notes

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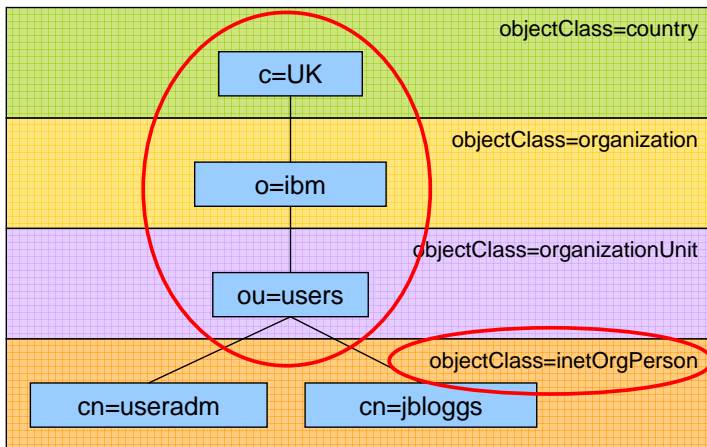
S

- Unlike on channels, there is no SSLCIPH parameter to turn on the use of SSL/TLS for the communication with the LDAP server. In this case MQ is acting as a client to the LDAP server so much of the configuration will be done at the LDAP server. Some existing parameters in MQ will be used to configure how that connection will work as shown on this slide.
- The overall switch to choose SSL/TLS communication or not, we already saw on the previous page – SECCOMM.
- In addition to this attribute, we will also pay attention to the queue manager attributes SSLFIPS and SUITEB to restrict the set of cipher specs that will be chosen. The certificate that will be used to identify the queue manager to the LDAP server will be the queue manager certificate, either 'ibmwebspheremq<qmgr-name>' or the newly added CERTLABL attribute which we'll talk about in an earlier section of this presentation.
- Certificate revocation will be checked by using the OCSP servers that are named in the AuthorityInfoAccess (AIA) certificate extensions. This can be turned off by using the qm.ini SSL stanza attribute OCSPCheckExtensions.
- Connection to an LDAP Server is made as a network connection (which is why you may wish to consider using a secure connection). The status of this connection from the queue manager to the LDAP server is shown in DISPLAY QMSTATUS.

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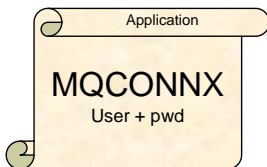
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# LDAP User Repository



LDAP Server

```
DEFINE AUTHINFO(USE.LDAP)
  AUTHTYPE(IDPWLDAP)
  CONNAME('ldapserver(389)')
  CLASSUSR('inetOrgPerson')
  BASEDNU('ou=users,o=ibm,c=uk')
  USRFIELD('cn')
```



Application provides	USRFIELD	BASEDNU
<code>cn=useradm,ou=users,o=ibm,c=uk</code>		
<code>cn=useradm</code>		Adds <code>ou=users,o=ibm,c=uk</code>
<code>useradm</code>	Adds <code>cn=</code>	Adds <code>ou=users,o=ibm,c=uk</code>

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## LDAP User Repository – Notes

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- When using an LDAP user repository there is some more configuration to be done on the queue manager other than just to tell the queue manager where the LDAP repository resides.
- User IDs records defined in an LDAP server have a hierarchical structure in order to uniquely identify them. So an application could connect to the queue manager and present its user ID as being the fully qualified hierarchical user ID. This however is a lot to provide and it would be simpler if we could configure the queue manager to say, assume all user IDs that are presented are found in this area of the LDAP server and add that qualification onto anything you see. This is what the `BASEDNU` attribute is for. It identifies the area in the LDAP hierarchy that all the user IDs are to be found. Or to look at it another way, the queue manager will add the `BASEDNU` value to the user ID presented by an application to fully qualify it before looking it up in the LDAP server.
- Additionally, your application may only want to present the user ID without providing the LDAP attribute name, e.g. `CN=`. This is what the `USRFIELD` is for. Any user ID presented to a queue manager without an equals sign (=) will have the attribute and the equals sign prepended to it, and the `BASEDNU` value post-pended to it before looking it up in the LDAP server. This may be a useful migratory aid when moving from O/S user IDs to LDAP user IDs as the application could very well be presenting the same string in both cases, thus avoiding any change to the application.

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## Connection Authentication – Relationship to Authorization – LDAP

Edit an entry cn=useradm,ou=users,o=ibm,c=uk Logfiles Help

**Edit an entry**  
→ Edit an entry  
Optional attributes

Object class inheritance:  
inetOrgPerson

Distinguished name (DN)

Relative DN: cn=useradm Parent DN: ou=users,o=ibm,c=uk Browse...

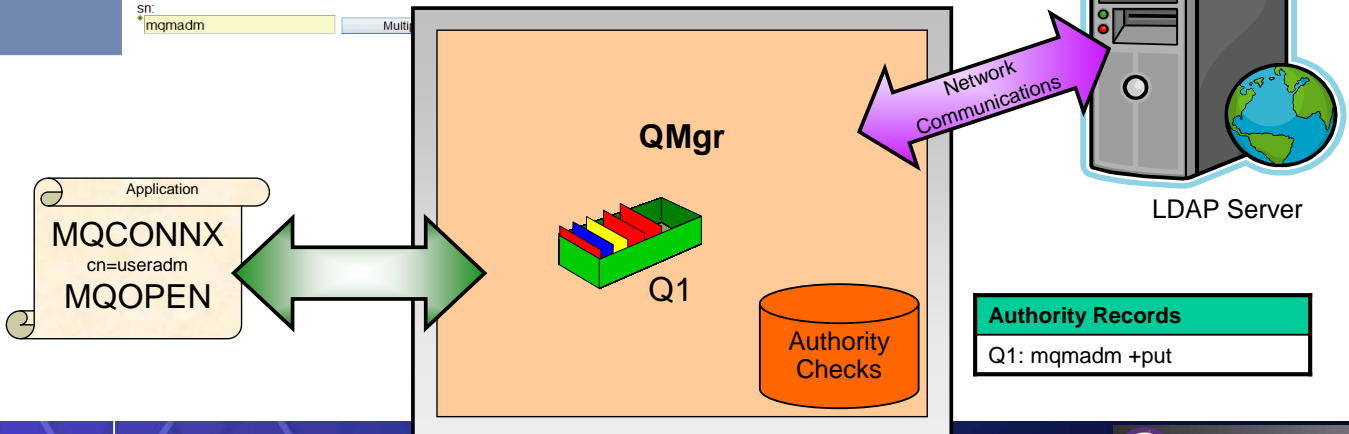
**Required attributes**

Enter the values for the attributes of the entry. For multiple values click **Multiple values** next to the attribute.

cn: useradm Multiple values

sn: mqmadm Multiple values

```
DEFINE AUTHINFO(USE.LDAP)
  AUTHTYPE(IDPWLDAP)
  CONNAME('ldap(389)')
  ADOPTCTX(YES)
  SHORTUSR('sn')
```



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## Relationship to Authorization – LDAP - Notes

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- We spoke earlier about the ability to adopt the authenticated user ID as the context for this connection. So how does this work if you are using LDAP as the user repository but your authorization is being done using O/S user IDs?
- We need to get a user to represent the LDAP user that has been presented, as an O/S user ID. We find this from the LDAP user record. This can be any field that is defined in the user record, perhaps something like the short name field (sn=) that is a mandatory part of the definition of the inetOrgPerson class, or perhaps something defined more specifically for the purpose such as a user ID (uid=) field.
- The queue manager will use that information to determine what O/S user ID will be used as the context for this connection. You configure it using SHORTUSR to say what the field to locate in the user record is.

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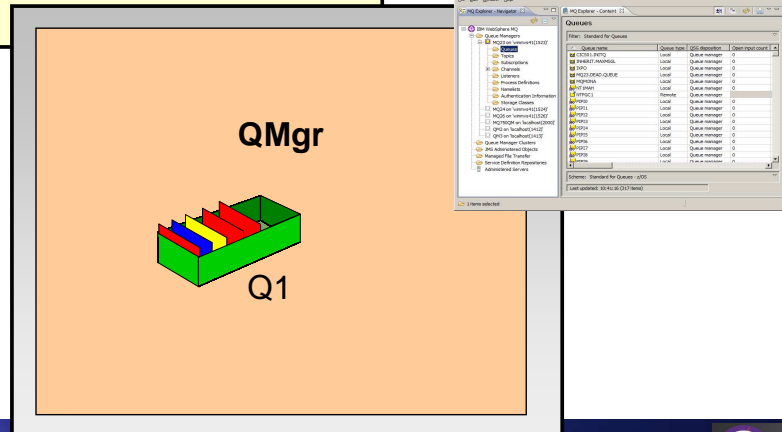


## Migration / Defaults

AUTHINFO(SYSTEM.DEFAULT.AUTHINFO.IDPWOS)  
 AUTHTYPE(IDPWOS)  
 CHCKLOCL(OPTIONAL)  
 CHCKCLNT(REQDADM)  
 FAILDLAY(1)  
 DESCR( )  
 ALTDATE(2013-12-25)  
 ALTTIME(12.00.00)

### Defaults

- ▶ Migrated queue manager
  - CONNAUTH(' ')
- ▶ New queue manager
  - CONNAUTH(←)



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## Migration / Defaults – Notes

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- By default, a migrated queue manager will find that CONNAUTH is blank – and therefore connection authentication is switched off.
- A brand new queue manager created with the WebSphere MQ V8 binaries will find that the CONNAUTH field points to the SYSTEM.DEFAULT.AUTHINFO.IDPWOS authentication information object.

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# Summary

## ■ Connection Authentication

- ▶ Application provides User ID and password in MQCSP
  - Or uses mqccred exit supplied
- ▶ Queue Manager checks password against OS or LDAP
  - ALTER QMGR CONNAUTH( 'CHECK.PWD' )
  - DEFINE AUTHINFO( 'CHECK.PWD' )  
AUTHTYPE( IDPWOS | IDPWLDAP )  
CHCKLOCL( NONE | OPTIONAL | REQUIRED | REQDADM )  
CHCKCLNT( NONE | OPTIONAL | REQUIRED | REQDADM )  
ADOPTCTX( YES )  
+ various LDAP attributes
  - REFRESH SECURITY TYPE( CONNAUTH )
- ▶ Password protection is provided when SSL/TLS not in use
  - Both ends of client channel are V8 or above



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# Questions?



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