DICOM Change Proposal

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Change Number CP-2553
Log Summary: Clarify how the origin server knows what user agents to notify in UPS-RS
Name of Standard PS3.18
Rationale for Change: In UPS-RS, subscriptions are created based on {aetitle}, see Section 11.10.1 Request. Note: CP-2395 renames this to {requester} for consistency across subscription-related URI templates. Section 11.10 Subscribe Transaction states that "To receive the notifications generated by Subscriptions, the user agent must have first opened a Notification Connection between itself and the origin server using the Open Notification Connection transaction; see Section 8.10.4." Yet, opening this connection (a WebSocket) does not specify the subscriber identifier (see 8.10.4 Open Notification Connection Transaction). How does the origin server know which connections/sockets to use to notify which subscriber? This CP addresses this by adding the subscriber identifier to the WebSocket connection request. The method for providing the subscriber identifier during WebSocket connection establishment was omitted during the PS3.18 rewrite. The pre-rewrite documentation (section 6.9.10) specified this detail. This CP restores this requirement, using the {requester} terminology established by CP-2395 for consistency with other subscription-related URI templates.
Change Wording: See below.

Update PS3.18, Section 8.10.4 Open Notification Connection Transaction, as follows:

8.10.4 Open Notification Connection Transaction

This transaction creates a connection between the user agent and the origin server over which the origin server can send Event Reports to the user agent.

Note

An origin server might play the role of a user agent when communicating with another origin-server.

The connection uses the WebSocket protocol. The connection can use the same TCP port as the HTTP connection, but they are separate connections.

See [RFC6455] for details of the WebSocket protocol.

8.10.4.1 Request

There is more than one way to establish a WebSocket connection. An origin server that conforms to [RFC6455] **and that supports subscriptions to notifications of RESTful Services** ~~will~~**shall** at least support requests to open a WebSocket over an HTTP connection that have the following syntax:

```
GET SP /subscribers/{requester} SP version CRLF

Host: host CRLF

Upgrade: "WebSocket" CRLF

Connection: "Upgrade" CRLF

Origin: url CRLF

Sec-WebSocket-Key: nonce CRLF

Sec-WebSocket-Protocol: protocols CRLF

Sec-WebSocket-Version: "13" CRLF

*(<header-field> CRLF)

CRLF
```

The origin server may support other methods of opening a WebSocket connection, which should be included in the Conformance Statement and the Retrieve Capabilities response.

8.10.4.1.1 Target Resources

~~**The Target Resource is an origin server implementing a DICOM RESTful Service.**~~

The origin server shall support the resources in Table 8.10.4-1a.

Table 8.10.4-1a. Open Notification Connection Transaction Resources

Resource	URI Template	Description
Notification Connection	**/subscribers/{requester}**	**Opens a WebSocket Notification Connection scoped to {requester}, the AE Title of the requesting user agent.**

8.10.4.1.2 Query Parameters

This transaction has no query parameters.

8.10.4.1.3 Request Header Fields

Table 8.10.4-1 shows the Request Header Field usage for opening a WebSocket connection over http/https.

Table 8.10.4-1. Request Header Fields

Name	Value	Usage
Content-Type	media-type	M
Upgrade	"WebSocket"	M
Connection	"Upgrade"	M
Origin	url	M
Sec-WebSocket-Key	accept-key	M
Sec-WebSocket-Protocol	protocols	O

Name	Value	Usage
Sec-WebSocket-Version	version	M

For details of the Request Header Field values and other methods of opening a WebSocket connection see [RFC6455].

8.10.4.1.4 Request Payload

The request has no payload.

8.10.4.2 Behavior

When the origin server receives this request, it shall open and maintain a WebSocket **Notification** ~~c~~**C**onnection between itself and the user agent**, and use it to send Event Report notifications for subscriptions associated with {requester}**.

If the connection is lost at any point, the user agent can re-establish it by repeating this transaction.

Editorial Note: PS3.18, 2018e is below for context:

6.9.10 OpenEventChannel

This resource opens a WebSocket channel that will be used to send Event Reports to the client.

See [RFC6455] for details on the WebSocket protocol.

6.9.10.1 Request

The request message shall be formed as follows:

- Resource
  - {+WSSERVICE}/subscribers/{AETitle}

    where

    - {+WSSERVICE} is the base URL for the WebSocket service. This shall include the WebSocket protocol (either WS or WSS) and may include a combination of authority and path
    - {AETitle} identifies the subscribed Application Entity.
- Method
  - GET

6.9.10.2 Behavior

The Origin-Server maintains the active WebSocket connection and uses it to send Event Report messages for UPS Instances which have subscriptions association with {AETitle} (see Section 6.9.7.2).

If the WebSocket connection is lost at any point the User-Agent can re-establish it by repeating the request.

The state of a WebSocket connection does not affect subscriptions and an Origin-Server is not required to queue messages when the connection is down.

Note

A User-Agent will only receive the initial state of a newly-subscribed UPS Instance if the WebSocket connection was initiated before creating the subscription