ACC, HIMSS and RSNA

Integrating the Healthcare Enterprise

IHE Patient Care Device Technical Framework Supplement 2007-2008 (Reissued for 2012 Connectathon)

Subscribe to Patient Data SPD

Trial Implementation

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Foreword

Integrating the Healthcare Enterprise (IHE) is an initiative designed to stimulate the integration of the information systems that support modern healthcare institutions. Its fundamental objective is to ensure that, in the care of patients, all required information for medical decisions is both correct and available to healthcare professionals. The IHE initiative is both a process and a forum for encouraging integration efforts. It defines a technical framework for the implementation of established messaging standards to achieve specific clinical goals. It includes a rigorous testing process for the implementation of this framework and it organizes educational sessions and exhibits at major meetings of medical professionals to demonstrate the benefits of this framework and encourage its adoption by industry and users.

The approach employed in the IHE initiative is not to define new integration standards, but rather to support the use of existing standards, HL7, IEEE, DICOM, IETF, and others, as appropriate in their respective domains in an integrated manner, defining configuration choices when necessary. When clarifications or extensions to existing standards are necessary, IHE refers recommendations to the relevant standards bodies.

This initiative has numerous sponsors and supporting organizations in different medical specialty domains and geographical regions. In North America the primary sponsors are the American College of Cardiology (ACC), the Healthcare Information and Management Systems Society (HIMSS) the Radiological Society of North America (RSNA), and the American College of Clinical Engineers (ACCE). IHE Canada has also been formed. IHE Europe (IHE-EUR) is supported by a large coalition of organizations including the European Society of Cardiology (ESC), European Association of Radiology (EAR) and European Congress of Radiologists (ECR), the Coordination Committee of the Radiological and Electromedical Industries (COCIR), Deutsche Röntgengesellschaft (DRG), the EuroPACS Association, Groupement pour la Modernisation du Système d'Information Hospitalier (GMSIH), Société Française de Radiologie (SFR), and Società Italiana di Radiologia Medica (SIRM). In Japan IHE-J is sponsored by the Ministry of Economy, Trade, and Industry (METI); the Ministry of Health, Labor, and Welfare; and MEDIS-DC; cooperating organizations include the Japan Industries Association of Radiological Systems (JIRA), the Japan Association of Healthcare Information Systems Industry (JAHIS), Radiological Society (JRS), Japan Society of Radiological Technology (JSRT), and the Japan Association of Medical Informatics (JAMI). Other organizations representing healthcare professionals are invited to join in the expansion of the IHE process across disciplinary and geographic boundaries.

The IHE Technical Frameworks for the various domains (IT Infrastructure, Cardiology, Patient Care Device, Laboratory, Radiology, etc.) define specific implementations of established standards to achieve integration goals that promote appropriate sharing of medical information to support optimal patient care. They are expanded annually, after a period of public review, and maintained regularly through the identification and correction of errors. The current version for these Technical Frameworks may be found at www.ihe.net .

The IHE Technical Frameworks identify a subset of the functional components of the healthcare enterprise, called IHE actors, and specify their interactions in terms of a set of coordinated, standards-based transactions. They describe this body of transactions in progressively greater depth.

This Trial Implementation supplement to the IHE Patient Care Device Technical Framework, first issued in 2007 and reissued for testing in the 2012 Connectation, describes an extension of the Device Enterprise Communication profile called Subscribe to Patient Data which allows the flow of data from a device data reporting system to be limited by a filter (Device Observation Filter actor). It is issued in this supplement form rather than integrated in the Final Text Technical Framework simply because the IHE Patient Care Device Technical Committee and Planning Committee voted that, up to the time that the Final Text Technical Framework was published, it had not been tested in enough implementations to move from Trial Implementation to Final Text status. It is hoped that additional successful testing in the 2012 Connectathon will take it beyond this threshold and it can be integrated in the next version of the Final Text Technical Framework.

Contents

1 Introduction

1.1 Overview of PCD–02 Transaction

Consuming all of the data from a collection of point-of-care devices (PCDs) at the rates at which meaningful parametric PCD data can be produced has been described as “drinking from a fire hose”. The Device Enterprise Communication (DEC) profile provides an optional publish/subscribe mechanism for applications to negotiate which PCD messages are communicated to a given application based on negotiated predicates.

The IHE PCD transaction to support “publish and subscribe” is the ‘PCD-02’ transaction that is defined by the IHE PCD Patient Care Device ‘Year 1’ (2006-2007) Technical Frameworks, Volumes 1 and 2. The ‘PCD-02’ transaction was not implemented during Year 1 due to time constraints but is now a candidate for implementation as an IHE PCD ‘Year 2’ (2007-2008) project.

“Publish and subscribe” refers to the ability of one system, the “Publisher”, to offer a data stream that can be sent to one or more recipient “Subscriber” systems.[1] The right of the Subscriber to subscribe is decided at interface setup time. At runtime, the Subscriber controls the data rules under which the Publisher sends messages.

The DEC profile describes a mechanism by which an optional Device Observation Filter (DOF) actor agrees to select a subset of a Device Observation message stream based on query-like data constraints. The right of the Device Observation Consumer (DOC) to subscribe is decided at interface setup time. At runtime, the DOC controls the data rules under which DOF sends messages.

The Actors are information systems or components of information systems that produce, manage, or act on information associated with operational activities in the enterprise. The following are the actors defined by IHE and referenced throughout the rest of this document, as well as in other domain Technical Framework documents.

1.

[1] In one sense, the entire HL7 unsolicited update paradigm, in which the sender transmits a stream of messages to recipients, is the simplest publish and subscribe mechanism.

1.2 Actor Description

New actors

Device Observation Filter – The Device Observation Filter (DOF) actor is responsible for providing PCD data filtering services based on publish/subscribe predicates negotiated with client applications implementing the Device Observation Consumer.

Existing actors

Device Observation Reporter – The Device Observation Reporter (DOR) actor receives data from PCDs, including those based on proprietary formats, and maps the data to messages that provide consistent syntax and semantics before sending them to the Device Observation Consumer or Device Observation Filter. The mechanism by which the DOR actor receives the PCD data is out of scope.

Device Observation Consumer – The Device Observation Consumer (DOC) is responsible for receiving PCD data from the Device Observation Reporter, the Device Observation Filter, or both.

Time Client – A system unit that synchronizes its time of day clock to the correct time provided by a time server

The following table shows which actors are used in which Integration Profiles.

Table 1 Integration Profile Actors

Integration Profile / Actor	DEC
Device Observation Reporter	X
Device Observation Filter	X
Device Observation Consumer	X
Time Client	X

2 Device Enterprise Communication (DEC)

The Device Enterprise Communication Integration Profile supports communication of vendor independent, multi-modality Patient Care Device data to Enterprise Applications using consistent semantics. It accomplishes this by mapping PCD data from proprietary syntax and semantics into a single syntactic and semantic representation for communication to the enterprise. The PCD data is time stamped with a consistent enterprise time. Options are provided to allow applications to filter particular PCD data of interest.

2.1 Actors/Transactions

Figure 1 DEC Integration Profile : Actors and Transactions diagrams the actors involved with this profile and the transactions between actors.

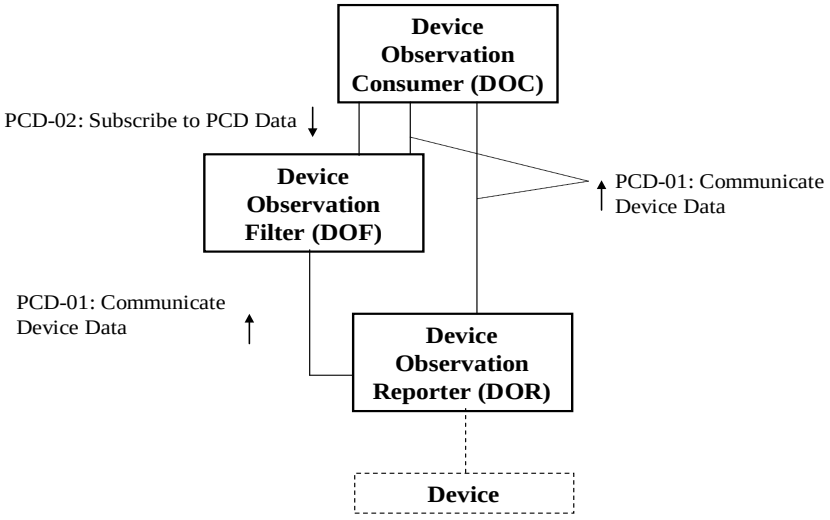


Figure 1 DEC Integration Profile : Actors and Transactions

Table 2 DEC - Actors and Transactions lists the transactions for each actor directly involved in the DEC Integration Profile. In order to claim support of this Integration Profile, an implementation must perform the required transactions (labeled "R"). Transactions labeled "O" are optional. A complete list of options defined by this Integration Profile that implementations may choose to support is listed in Section 2.3.

Table 2 DEC - Actors and Transactions

Actors	Transactions	Optionality	Section
Device Observation Consumer	Communicate PCD Data [PCD-01]	R	Section 2
	Subscribe to PCD Data [PCD-02]	O	Section 2
Device Observation Filter	Communicate PCD Data [PCD-01] (Outbound Only)	R	Section 2
	Communicate PCD Data [PCD-01] (Inbound Only)	O	Section 2
	Subscribe to PCD Data [PCD-02]	R	Section 2
Device Observation Reporter	Communicate PCD Data [PCD-01]	R	Section 2

2.2 DEC Integration Profile Options

Many actors have Options defined in order to accommodate variations in use across domains or implementations. Options that may be selected for this Integration Profile are listed in Table 3 DEC - Actors and Options along with the actors to which they apply. Certain of these Options are required for implementation by actors in this Profile (although they may be truly optional in other Profiles).

Table 3 DEC - Actors and Options

Actor	Option Name	Vol & Section
Device Observation Consumer	Subscribe to PCD Data	TF-1:2.1
Observation Filter	No options defined	
Device Observation Reporter	No options defined	

2.3 DEC Use Cases and Interaction Diagram

This Section describes the specific use cases and interactions defined for the DEC Workflow Profile. The Use Cases fall into two distinct groups based upon the choice to implement the optional Subscribe to PCD Data [PCD-02] transaction. The two groups are described below.

2.3.1 Case C1: Communicate patient identified data to EMR/EHR

Data from all of the patient care devices associated with a particular patient is communicated by a Clinical Information System (CIS) implementing the DOR actor to a EMR/EHR, implementing the DOC actor. Examples include data from bedside monitors, ventilators, and infusion pumps. Discrete parameters representing both periodic and aperiodic data are communicated to the CIS at an interval no less than 1 minute. The data is time stamped with a consistent time across the data from the respective patient care devices.

The primary intent is communication of structured data, however provisions are made for inclusion of unstructured data. The application provides facilities to bind an authoritative enterprise patient identifier required for inclusion of the PCD data in the patient record. The workflow for associating the authoritative enterprise patient identifier to the PCD data is outside the scope of the current PCD TF.

2.3.2 Case C2: Communicate validated periodic data to EMR/EHR

This Use Case builds on Case C1 by communicating only data which has been validated by a caregiver by identifying the caregiver in the PCD data. The workflow implementing validation is outside the scope of the current PCD TF.

2.3.3 Case F1: Subscribe To PCD Data at specific periodic interval.

An EHR does not require data at the frequency that the Device Observation Reporter uses for default reporting. To receive data at an acceptable interval the EHR application makes a request of the Device Observation Filter for a subscription specifying the frequency or range of allowable frequencies at which PCD data should be sent to the EHR application.

2.3.4 Case F2: Subscribe To PCD Data for specfic patients.

A clinical research application is being evaluated for clinical decision support on a specific population of patients, for example. The application requests a subscription for PCD data for a known group of patients appropriate to the study being conducted.

2.3.5 Case F3: Subscribe To PCD Data for patients from a specific location.

A clinical application only wants to be informed of PCD data for patients in a specific hospital unit, for example. The application requests a subscription for PCD data for the hospital unit of interest.

2.3.6 Case F4: Subscribe To PCD Data for a specific device or class of devices

A respiratory clinical decision support application only requires data from ventilators, for example. The application requests a subscription for PCD data for ventilators.

2.3.7 Case F5: Subscribe To PCD Data for specific parameters or class of parameters.

A clinical decision support application is based upon correlation of a selected set of monitored PCD data. The application requests a subscription for only the PCD data of interest.

2.3.8 Case F6: Request a snapshot of current or most recent PCD Data.

An EHR or other application requests a 'snapshot' of the current or most recent data for the patient. After the data is sent the connection is left open until closed by the DOC.

The interaction diagram for Use Cases C1 and C2 are shown in Figure 2 and the interaction diagram for Use Cases F1 through F6 are shown in Figure 3 on the following page.

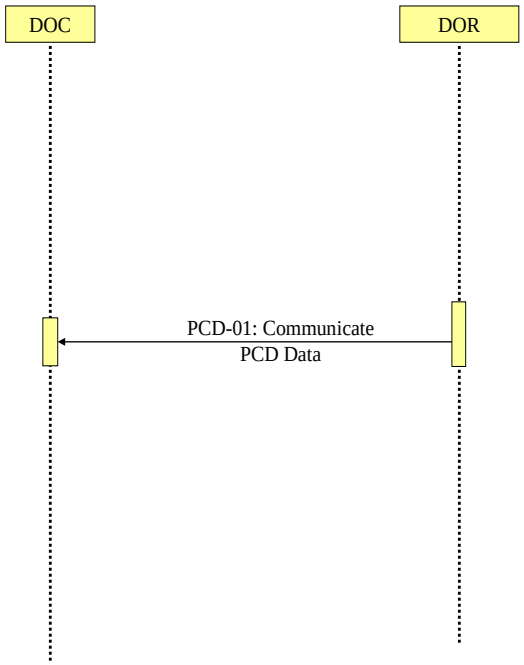
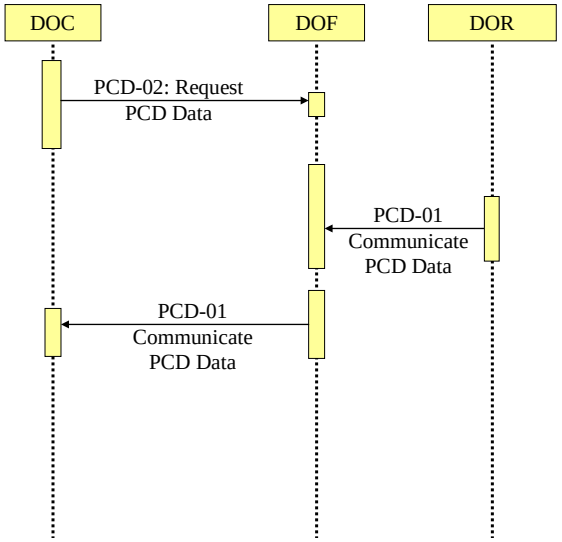


Figure 2 DEC Interactions (No filtering)



Note: An implementation may combine the DOF and DOR into a single system, in which case the PCD-01 transaction shown on the right need not be externally available outside the combined system.

Figure 3 DEC Interactions (With filtering)

3 Transaction PCD-02 Subscribe to PCD Data

This section corresponds to Transaction PCD-02 of the IHE Patient Care Device Technical Framework. Transaction PCD-02 is used by the Device Observation Filter, and Device Observation Consumer actors.

Common HL7 segments (MSH, MSA, ERR, NTE, PID, PV1, OBR, OBX, QPD, RCP) and data types (CE, CX, EI, HD, PL, TS, XPN, XTN) used in IHE PCD-02 transactions are defined in Appendix B and in the Technical Framework documents for 'Year 1' (2006-2007) .

3.1.1 Scope

This transaction is used by a Device Observation Consumer (DOC) to subscribe for PCD Data from a Device Observation Filter (DOF).

3.1.2 Use Case Roles

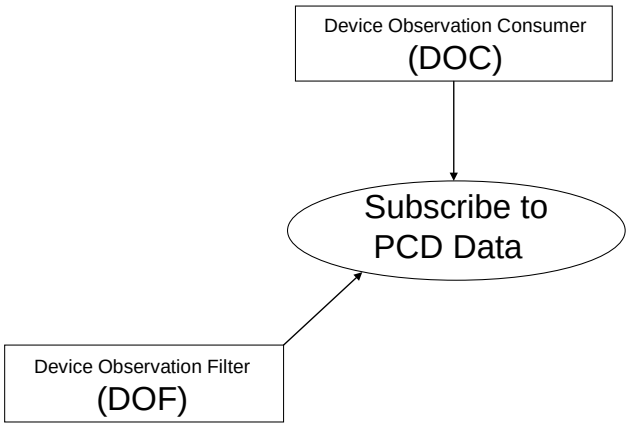


Figure 4 Subscribe to PCD Data Use Case

Actor: Device Observation Filter

Role: Receives subscription request from the DOC and sets up filtering such that only those PCD-01 messages which satisfy the filter predicates are communicated to the DOC. In the absence of any explicit predicates regarding starting and stopping, the DOF will start as soon as the configuration of the predicate filters is completed and will continue until an explicit stop

transaction is received.[2] Each DOF shall be capable of supporting one or more subscriptions from a DOC.

Actor: Device Observation Consumer

Role: Subscribes to PCD data.

3.1.3 Referenced Standards

- HL7 - Health Level 7 Version 2.5 Ch5 Query and CH7 Observation Reporting
- ISO/IEEE 11073-10201 Domain Information Model
- ISO/IEEE 11073-10101 Nomenclature

3.1.4 Interaction Diagram

The PCD-02 is used by a Device Observation Consumer (DOC) to subscribe for PCD Data from a Device Observation Filter (DOF). The transaction is based on the HL7 Publish and Subscribe Query model where the Device Observation Filter (DOF) plays the role of Publisher and the Device Observation Consumer (DOC) plays the role of Subscriber. The DOF defines a stream of data, but also agrees to selectively subset the message stream based on query-like data constraints.

The right of the Device Observation Consumer (DOC) to subscribe is decided at interface setup time. At runtime, the DOC controls the data rules, based on the subscription, under which DOF sends messages. Prospective data may be sent for a specified period of time, or for an open-ended period of time until further notice. Specific messages have been defined for subscription and the canceling of a subscription. See HL7 V2.5 Ch 5.7 for details of the Publish/Subscribe model.

1.

[2] The DOC may cancel a subscription using the QSX/ACK 'cancel subscription/acknowledge' message sequence described in HL7 V2 Chapter 5 (Query), Sections 5.4.7 and 5.7.5.

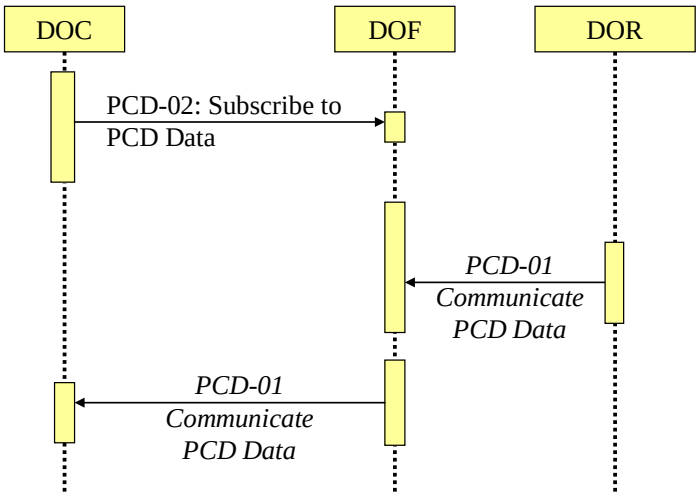


Figure 5 Subscribe to PCD Data Interaction Diagram

3.1.5 Message Static Definitions

3.1.5.1 Conformance Statement

The HL7 Query model requires the definition of a Conformance Statement. The conformance statement for the PCD-02 Subscribe to PCD Data transaction described below is adapted from HL7 V2.5.

Table 4 Conformance Statement

Publication ID (Query ID=Z02):	Z02
Type:	Publish
Publication Name:	IHEPCD-02SubscribeToPCDData
Query Trigger (= MSH-9):	QSB^Z02^QSB_Q16
Query Mode:	Immediate
Response Trigger (= MSH-9):	ORU^R01^ORU_R01 (PCD-01)
Query Characteristics:	Returns PCD data as defined by the query characteristics
Purpose:	Communicate PCD data using the PCD-01 transaction, either filtered or unfiltered, as specified in the input parameters.
Response Characteristics:	PCD-01 ORU messages are returned corresponding to the constraints expressed in the input parameters. The input parameters are ANDed when selecting data to be returned. That is, all input parameters that are specified must be satisfied in order for a result report to be sent. Parameters that are left empty are ignored in defining the filter criteria

Publication ID (Query ID=Z02):	Z02
Based on Segment Pattern:	R01

3.1.6 PCD-02 – QSB^Z02^QSB_Q16 static definition

Common HL7 segments (MSH, MSA, ERR, NTE, PID, PV1, OBR, OBX, QPD, RCP, TQ1) and data types (CE, CQ,CX, EI, HD, PL, TS, XPN, XTN) used in IHE PCD-02 transactions are defined in Appendix B and in the Technical Framework documents for 'Year 1' (2006-2007).

Table 5 PCD-02 - QSB^Z02^QSB_Q16 static definition

QSB^Z02^QSB_Q16	Query Grammar: QSB Message	Usage	Card.	Section Ref.
MSH	Message Header Segment	R	[1..1]	2.15.9
[{SFT}]	Software Segment	X	[0..0]	2.15.12
QPD	Query Parameter Definition	R	[1..1]	5.5.4
RCP	Response Control Parameter	R	[1..1]	
[DSC]	Continuation Pointer	CE	[0..1]	2.15.4

The IHE PCD TF supports filtering based on the parameters defined in Table 6 QPD Input Parameter Specification and described in Table 7 QPD Input Parameter Field Descripion and Commentary.

Table 6 QPD Input Parameter Specification

Field Seq (Query ID=Z02)	ColName	Key/Search	Sort	LEN	DT	Opt	RP/#	MatchOp	TBL #	Segment Field Name	Service Identifier Code	Element Name
1	MessageQueryName			60	CE	R	**[1..1]**					Message Query Name
2	QueryTag			32	ST	R	**[1..1]**					Query Tag
3	MRN				CX	O	[0..20]			PID.3		
4	ActionCode				ID	O	[0..1]		0323			
5	PatientLocation				PL	O	[0..20]			PV1.3		
6	DeviceClass				CE	O	[0..6]			OBX.3		
7	ParameterClass				CE	O	[0..6]			OBX.3		
8	StartDateTime				TS	O	[0..1]			TQ1-7		
9	EndDateTime				TS	O	[0..1]			TQ1-8		

Field Seq (Query ID=Z02)	ColName	Key/ Search	Sort	LEN	DT	Opt	RP/#	MatchOp	TBL #	Segment Field Name	Service Identifier Code	Element Name
10	Interval				CQ	O	[0..1]			TQ1-5		

Table 7 QPD Input Parameter Field Descripion and Commentary

Input Parameter (Query ID=ZXX)	Comp. Name	DT	Description
MessageQueryName		CE	Must be valued **Z02^PCD-02-Subscription**.
QueryTag		ST	Unique to each query message instance.
MRN		CX	One or more patient identifiers may be sent. When a list is provided, results will be sent if any parameter matches any ID known for a patient. Sending no value matches all patients
ActionCode		ID	If the subscription is being modified, the desired action e.g., Add or Delete is carried in this field. Must be 'A', 'D', or null.
PatientLocation		PL	When a list is provided, results will be sent if any parameter matches PV1.3 for any result. Sending no value matches all results.
DeviceClass		CE	When a list is provided, results will be sent if any parameter matches OBX.3 for any result. Sending no value matches all results.
ParameterClass		CE	When a list is provided, results will be sent if any parameter matches OBX.3 for any result... Sending no value matches all results.
StartDateTime		TS	The date/time at which the subscription is to start. If null, the subscription starts immediately
EndDateTime		TS	The date/time at which the subscription is to end. If null, the subscription continues indefinitely.
Interval		CQ	The interval between observation reports, in seconds. The DOF may return the closest 'native' reporting interval available from the DOR.

The IHE PCD TF supports the RCP response control parameters described in Table 8 RCP Response Control Parameter Field Description and Commentary.

Table 8 RCP Response Control Parameter Field Description and Commentary

Field Seq (Query ID=Z99)	Name	Compo-nent Name	LEN	DT	Description
1	Query Priority		1	ID	**I**
3	Response Modality		60	CE	**R**

3.1.6.1 Trigger events

The QSB^Z02^QSB_Q16 message is defined by the IHE PCD based on the rules defined in HL7 v2.5 Chapter 5.7 for Publish and Subscribe messages. The QSB^Z02^QSB_Q16 is sent from a

DOC to a DOF for the purpose of creating a new subscription or modifying an existing subscription. Permission for a DOC to send the QSB^Z02^QSB_Q16 to a DOF is defined at implementation time.

3.1.6.2 Message Semantics

Refer to HL7 2.5 Chapter 5.4.4 for the general message semantics of the QSB message and Chapter 5.7 for the details of Publish and Subscribe.

The IHE PCD QSB^Z02^QSB_Q16 message defines the parameters which define the filter to be applied to a stream of device observation messages. The current version of the IHE PCD TF provides facilities for selecting messages based on:

- A list of one or more patients identified by a patient identifier
- A list of one or more patient locations
- A list of one or more device classes
- A list of one of more specific device parameter classes

The IHE PCD QSB^Z02^QSB_Q16 also provides parameters which define the:

- Date and time at which the subscription is to begin, the default is immediately.
- Date and time at which the subscription is to end, the default is never.
- The interval between periodic reports.

The parameters of the QSB^Z02^QSB_Q16 are combined based on a logical AND to define the overall query. For those parameters which define a list of one or more entries the elements of the list are combined based on a logical OR and satisfaction of any member of the list satisfies the condition for the respective parameter.

If the Action Code is set to A, the parameters are added to an existing subscription.

If the Action Code is set to D, the parameters are deleted from an existing subscription.

3.1.6.3 Expected Action

Upon receipt of the first QSB^Z02^QSB_Q16 sent by the DOC, the DOF establishes a subscription based on the parameters defined and communicates messages satisfying the subscription predicate(s) using the PCD-01 transaction to send data to the subscriber.

Subsequent QPDs may be sent to add ‘A’ (or delete ‘D’) individual QPDs to (or from) a list of active QPDs maintained by the DOF that controls the content of the filtered PCD-01 stream. The filtered PCD-01 stream is the union (with duplicates removed) of the filtered output for each of the active QPDs associated with the PCD-01 subscription.

The DOC is the initiator of the subscription and connection and the DOF shall send the filtered PCD-01 data to the DOC over the same connection.[3] The DOF shall be capable of supporting one or more subscriptions from a DOC, each utilizing an independent connection.

The DOC may cancel a subscription using the QSX/ACK 'cancel subscription/acknowledge' message sequence described in HL7 V2 Chapter 5 (Query), Sections 5.4.7 and 5.7.5.

The DOF shall maintain an active connection to the DOC until one or more of the following conditions occur:

(1) the subscription is cancelled by the DOC using the QSX/ACK message;

(2) the DOF does not have (or expect to have) any data to send for a prolonged period of time; or

(3) the DOR 'tears down' the connection without sending a QSX/ACK message.

If any of the above conditions occurs, the DOF shall cancel all subscriptions and the outbound PCD-01 stream associated with the connection and then 'tear down' the connection.

Scenario (3) provides a convenient method of allowing the DOC to request frequent 'snapshot' data (having a specified start and end time) and maintaining an 'active' connection to efficiently support subsequent requests.

1.

[3] HL7 Chapter 5 (Query) assumes a point-to-point connection between client (DOC) and server (DOF) and does not discuss other options, such as directing the output of a subscription to another system. Also, most 'off-the-shelf' security solutions are designed to run over point-to-point links.

3.2 Common Message Segments

3.2.1 QPD Query Parameter Definition Segment

The QPD segment defines the parameters of the query.

Table 9 HL7 Attribute Table - QPD - Query Parameter Definition

SEQ	LEN	DT	Usage	Card	TBL#	ITEM#	ELEMENT Value for PCD-02
1	250	CE	R	[1..1]	0471	01375	Z02^PCD-02-Subscription^
2	32	ST	C	[0..1]		00696	Query Tag
3	256	Varies	R	[1..*]		01435	User Parameters (in successive fields)

QPD-1 Message Query Name (CE) 01375

```
Components:  <Identifier (ST)> ^ <Text (ST)> ^ <Name of Coding System (ID)> ^
             <Alternate Identifier (ST)> ^ <Alternate Text (ST)> ^ <Name of Alternate
             Coding System (ID)>
```

Definition: This field contains the name of the query. These names are assigned by the function-specific chapters of the HL7 V2.5 specification. It is one to one with the conformance statement for this query name, and it is in fact an identifier for that conformance statement. Site-specific query names begin with the letter "Z." Refer to HL7 User defined table 0471 - Query name for suggested values.

Table 10 HL7 User-defined Table 0471 - Query name

Value	Description	Comment
Z02	PCD-02-Subscription	Used for IHE PCD-02 transaction

QPD-2 Query Tag (ST) 00696

Definition: This field may be valued by the initiating system to identify the query, and may be used to match response messages to the originating query. If this field is valued, the responding system is required to echo it back as the first field in the query acknowledgement segment (QAK). This field shall be valued if the associated QPDs can be added 'A' or deleted 'D' at a later time.

This field differs from MSA-2-Message control ID in that its value remains constant for each message (i.e. all continuation messages) associated with the query, whereas MSA-2-Message control ID may vary with each continuation message, since it is associated with each individual message, not the query as a whole.

Implementation considerations: It is not necessary to value this field in implementations where the only return message on the socket will be the response to the query that was just sent. Conversely, in an "asynchronous" implementation where many queries, responses, and

other messages may be communicated bidirectionally over the same socket, it is essential that this field be valued so that the Client knows to which query the Server is responding.

QPD-3 User Parameters (Varies) 01435

Definition: These successive parameter fields hold the values that the Client passes to the Server.

The client data is presented as a sequence of HL7 fields. Beginning at *QPD-3-User parameters*, the remaining fields of the QPD segment carry user parameter data. Each QPD user parameter field corresponds to one parameter defined in the Conformance Statement, where each name, type, optionality, and repetition of each parameter has been specified. While these parameters are understood to be usually "and ed" together, the user must inspect the required Conformance Statement to properly understand each.

For the PCD-TF each parameter field is specified in the Conformance Statement to be a segment group (ID) field

Parameter fields in the QPD segment appear in the same order as in the Conformance Statement.

3.2.2 RCP – Response Control Parameter Segment

The RCP segment is used to restrict the amount of data that should be returned in response to query.

Table 11 HL7 Attribute Table – RCP – Response Control Parameter

SEQ	LEN	DT	Usage	Card	TBL#	ITEM#	ELEMENT NAME
1	1	ID	R		0091	00027	Query Priority
2	10	CQ	X		0126	00031	Quantity Limited Request
3	250	CE	R		0394	01440	Response Modality
4	26	TS	X			01441	Execution and Delivery Time
5	1	ID	X		0395	01443	Modify Indicator
6	512	SRT	X	Y		01624	Sort-by Field
7	256	ID	X	Y		01594	Segment group inclusion

RCP-1 Query Priority (ID) 00027

Definition: This field contains the time frame in which the response is expected. Refer to HL7 Table 0091 - Query priority for valid values. Table values and subsequent fields specify time frames for response.

Table 12 HL7 Table 0091 - Query Priority

Value	Description	Comment
D	Deferred	Not used for PCD-TF
I	Immediate	Required for PCD-TF

RCP-3 Response Modality (CE) 01440

Components: <Identifier (ST)> ^ <Text (ST)> ^ <Name of Coding System (ID)> ^ <Alternate Identifier (ST)> ^ <Alternate Text (ST)> ^ <Name of Alternate Coding System (ID)>

390 Definition: This field specifies the timing and grouping of the response message(s). Refer to HL7 Table 0394 – Response modality for valid values.

HL7 Table 0394 – Response modality

Value	Description	Comment
R	Real Time	Required for PCD TF
T	Bolus (a series of responses sent at the same time without use of batch formatting)	Not Used for PCD TF
B	Batch	Not Used for PCD TF

Annex A: Glossary

ACC: American College of Cardiology http://www.acc.org/

ACCE: American College of Clinical Engineering http://www.accenet.org/

Actor: An entity within a use case diagram that can perform an action within a use case diagram. Possible actions are creation or consumption of a message

ADT: Admit, Discharge & Transfer.

Alarm: A clinical alarm is an indication from a system or device, that when activated, indicates a condition requiring urgent clinical intervention.

Alert: A clinical alert is an indication from a system or device that a condition exists which requires attention.

Aperiodic: PCD data which occurs at irregular intervals such as a Cardiac Output measurement.

Authoritative: Acknowledged to be reliable.

Bedside: The point of care, typically in an acute care environment.

Binding: Process of associating two related elements of information.

Biometric: measurable, physical characteristic or personal behavioral trait used to recognize the identity, or verify the claimed identity.

CDR: Clinical Data Repository.

CIS: Clinical Information System.

CLIA: Clinical Laboratory Improvement Amendments. **http://www.cms.hhs.gov/clia/**

Connectathon: IHE testing process a weeklong interoperability testing event where participating companies to test their implementation of IHE capabilities with corresponding systems from industry peers.

CT: Consistent Time Integration Profile.

DEC: Device Enterprise Communication**.**

DICOM: Digital Imaging and Communications in Medicine. http://medical.nema.org/

DOB: Date of Birth.

DOC: Device Observation Client: Actor responsible for receipt of PCD data.

DOF: Device Observation Filter: Actor responsible for filtering of PCD transactions based on negotiated predicate.

DOR: Device Observation Reporter: Actor responsible for mapping legacy and standards based PCD data to the IHE PCD message profile(s). Based upon the ISO/IEEE 11073.

ECG: Electrocardiogram**.**

EEG: Electroencephalogram.

EHR: Electronic Health Record.

eMPI: Enterprise Master Patient Index.

EMR: Electronic Medical Record.

HIMSS: Healthcare Information and Management Systems Society.

HIS: Hospital Information System.

HL7: Health Level 7. http://www.hl7.org/

IHE: Integrating the Healthcare Enterprise.

IEEE: Institute of Electrical and Electronics Engineers. http://www.ieee.org

IETF: Internet Engineering Task Force. http://www.ietf.org/

MPI: Master Patient Index – see eMPI.

Interaction Diagram: A diagram that depicts data flow and sequencing of events.

IT: Information Technology.

MPI: Master Patient Index.

MRN: Medicare Record Number or Medical Record Number.

NEMA: National Electrical Manufacturers Association.

NTP: Network Time Protocol. This is the standard Internet protocol for synchronizing computer clocks. The web site http://www.ntp.org provides extensive background documentation at the introductory and expert level on how to synchronize computers.

Role: The actions of an actor in a use case.

PCD: Patient care device.

Physiologic: Mechanical, physical, and biochemical functions of living organisms.

RFC: Request for comment. http://www.rfc-editor.org/

RFID: Radio frequency identification.

RSNA: Radiological Society of North America. http://www.rsna.org/

Scope: A brief description of the transaction.

SNTP: Simple Network Time Protocol. This is a reduced accuracy version of NTP. The protocol fields are the same, but the data values and algorithms used are greatly reduced accuracy so that it can be implemented on limited capacity systems.

Subscribe: Make a request that only messages satisfying specific predicates be sent to the subscriber.

Trigger Event: An event such as the reception of a message or completion of a process, which causes another action to occur.

UID: Unique Identifier

Unsolicited: Within the context of HL7 when the transfer of information is initiated by the application system that deals with the triggering event, the transaction is termed an unsolicited update.

Universal ID: Unique identifier over time within the UID type. Each UID must belong to one of specifically enumerated species. Universal ID must follow syntactic rules of its scheme.

Use Case: A graphical depiction of the actors and operation of a system.

UTC: Universal Coordinated Time. This is the replacement for GMT. It defines a reference time base that is internationally recognized and supported.

Validated: PCD data which has been marked as correct by a caregiver.

Annex B: Example PCD-02 Message

This subscription is for a one day of data for the patient location 3WICU^^305-1 and the collection interval is set to one minute. The first the PCD-01 results data message sent by the DOF is also shown for reference.

PCD-02 Subscription

```
MSH|^~\&|HL7^080019FFFF4F6AC0^EUI-64|MMS|||20070827080000||QSB^Z02^QSB_Q16|a4e2e3:110b8122462:-
|P|2.5|20070827080000||NE|AL||8859/1

QPD| Z02^PCD-02-Subscription|1001|ABC1|A|3WICU^^305-1|||20070827080000|20070828080000|60

RCP|I||1001^ OneDay ^ IEEE MDC ^3 3WICU 305-1 ^ IEEE PCD-02 ^None
```

PCD-01 Results

```
MSH|^~\&|HL7^080019FFFF4F6AC0^EUI-
64|MMS|||20070827080100||ORU^R01|12c7568:1102d416eae:|P|2.5|20070827080100||NE|AL||8859/1
PID|||ABC1^^^DefaultDomai||JACKSON^IRWIN^^^^^L
PV1||E|3WICU^^305-1
OBR|1|080019FFFF4F6AFE200701|080019FFFF4F6AC0200701|126.3.3.1^2000^MDC|||20070827080100
OBX|1|NM|147842^MDC_ECG_HEART_RATE^MDC|1.6.1.1|60|/min^/min^UCUM|||||R
OBX|2|NM|148065^MDC_ECG_V_P_C_CNT^MDC|1.6.1.2|0|/min^/min^UCUM|||||R
OBX|3|NM|145665^MDC_ECG_ELEC_POTL_ST_80_I^MDC|1.7.1.1|0.0|mm^mm^UCUM|||||R
OBX|4|NM|145666^MDC_ECG_ELEC_POTL_ST_80_II^MDC|1.7.1.2|0.0|mm^mm^UCUM|||||R
OBX|5|NM|145725^MDC_ECG_ELEC_POTL_ST_80_III^MDC|1.7.1.3|0.0|mm^mm^UCUM|||||R
OBX|6|NM|145671^MDC_ECG_ELEC_POTL_ST_80_V5^MDC|1.7.1.4|0.0|mm^mm^UCUM|||||R
OBX|7|NM|145726^MDC_ECG_ELEC_POTL_ST_80_AVR^MDC|1.7.1.5|0.0|mm^mm^UCUM|||||R
OBX|8|NM|145727^MDC_ECG_ELEC_POTL_ST_80_AVL^MDC|1.7.1.6|0.0|mm^mm^UCUM|||||R
OBX|9|NM|145728^MDC_ECG_ELEC_POTL_ST_80_AVF^MDC|1.7.1.7|0.0|mm^mm^UCUM|||||R
OBX|10|NM|150035^MDC_PRESS_BLD_ART_MEAN^MDC|1.3.1.1|92|{mm[Hg]}^{mm[Hg]}^UCUM|||||R
OBX|11|NM|150033^MDC_PRESS_BLD_ART_SYS^MDC|1.3.1.2|120|{mm[Hg]}^{mm[Hg]}^UCUM|||||R
OBX|12|NM|150034^MDC_PRESS_BLD_ART_DIA^MDC|1.3.1.3|80|{mm[Hg]}^{mm[Hg]}^UCUM|||||R
OBX|13|NM|149522^MDC_BLD_PULS_RATE_INV^MDC|1.2.1.1|60|/min^/min^UCUM|||||R
OBX|14|NM|150047^MDC_PRESS_BLD_ART_PULM_MEAN^MDC|1.4.2.1|14|{mm[Hg]}^{mm[Hg]}^UCUM|||||R
OBX|15|NM|150045^MDC_PRESS_BLD_ART_PULM_SYS^MDC|1.4.2.2|24|{mm[Hg]}^{mm[Hg]}^UCUM|||||R
OBX|16|NM|150046^MDC_PRESS_BLD_ART_PULM_DIA^MDC|1.4.2.3|10|{mm[Hg]}^{mm[Hg]}^UCUM|||||R
OBX|17|NM|151610^MDC_VENT_CO2_RESP_RATE^MDC|1.5.1.1|12|{{breath}/min}^{{breath}/min}^UCUM|||||R
OBX|18|NM|151804^MDC_PRESS_AWAY_END_EXP_POS^MDC|1.5.1.2|4|{cm[H20]}^{cm[H20]}^UCUM|||||R
OBX|19|NM|152008^MDC_VENT_VOL_MINUTE_AWAY^MDC|1.5.1.3|0.0|l/min^l/min^UCUM|||||R
OBX|20|NM|151920^MDC_VENT_CONC_AWAY_O2_INSP^MDC|1.5.1.4|21|%^%^UCUM|||||R
OBX|21|NM|151980^MDC_VENT_VOL_TIDAL^MDC|1.5.1.5|920|ml^ml^UCUM|||||R
OBX|22|NM|151957^MDC_VENT_PRESS_MAX^MDC|1.5.1.6|17|{cm[H20]}^{cm[H20]}^UCUM|||||R
OBX|23|NM|151784^MDC_PRESS_RESP_PLAT^MDC|1.5.1.7|31|{cm[H20]}^{cm[H20]}^UCUM|||||R
OBX|24|NM|151792^MDC_PRESS_AWAY^MDC|1.5.1.8|36|{cm[H20]}^{cm[H20]}^UCUM|||||R
OBX|25|NM|151808^MDC_PRESS_AWAY_END_EXP_POS_INTRINSIC^MDC|1.5.1.9|1|{cm[H20]}^{cm[H20]}^UCUM|||||R
OBX|26|NM|150344^MDC_TEMP^MDC|1.10.1.1|24.8|cel^cel^UCUM|||||R
OBX|27|NM|150344^MDC_TEMP^MDC|1.10.1.2|38.6|cel^cel^UCUM|||||R
```