Integrating the Healthcare Enterprise

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IHE Patient Care Device
Technical Framework Supplement

10

Alarm Communication Management
(ACM)

15

Trial Implementation

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Foreword

This is a supplement to the IHE Patient Care Device Technical Framework V2.0. Each supplement undergoes a process of public comment and trial implementation before being
30   incorporated into the volumes of the Technical Frameworks.

This supplement is submitted for Trial Implementation as of August 16, 2012 and may be available for testing at subsequent IHE Connectathons. The supplement may be amended based on the results of testing. Following successful testing it will be incorporated into Patient Care Device Final Text Technical Framework. Comments are invited and may be submitted at
35   http://www.ihe.net/pcd/pcdcomments.cfm.

This supplement describes changes to the existing technical framework documents and where indicated amends text by addition (**bold underline**) or removal (~~**bold strikethrough**~~), as well as addition of large new sections introduced by editor's instructions to "add new text" or similar, which for readability are not bolded or underlined.

40   "Boxed" instructions like the sample below indicate to the Volume Editor how to integrate the relevant section(s) into the relevant Technical Framework volume:

Replace Section X.X by the following:

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45   General information about IHE can be found at: www.ihe.net

Information about the IHE Patient Care Device domain can be found at: http://www.ihe.net/Domains/index.cfm

Information about the structure of IHE Technical Frameworks and Supplements can be found at: http://www.ihe.net/About/process.cfm and http://www.ihe.net/profiles/index.cfm

50   The current version of the IHE Technical Framework can be found at: http://www.ihe.net/Technical_Framework/index.cfm

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Introduction

Profile Abstract

205 This supplement extends the Device Enterprise Communication profile of the IHE Patient Care Devices domain to further specify the communication of alarm data describing states and events significant to patient care from patient care devices to alarm manager systems (systems which route alarms to end devices for notification of caregivers or for alarm logging purposes).

These alarms may be physiological, that is, representing the physiological state of the patient (such as a heart rate above or below a caregiver-specified safe range for the patient), or technical,
210 reflecting conditions in the patient care devices themselves that may require action from caregivers (such as ECG leads off the patient).

The intent of this supplement is to give a uniform way of representing such common alarm conditions in HL7 messages to facilitate interoperability of systems from different vendors.

Open Issues and Questions

215 None.

Closed Issues

It was decided to treat alarm representation in HL7 as an extension of previous PCD work for observation reporting from patient care devices, with multiple OBX segments representing the aspects of an alarm that did went beyond what could readily be represented in the single OBX
220 segment per parameter model previously used.

ISO/IEEE 11073 was selected as the preferred coding system for parameters and events to be used in the communication of alarms. If no applicable term is available in that nomenclature and a LOINC term is, the LOINC term may be used.

Aside from that which is directly affected by this profile, communication and functionality
225 within alarm manager systems and the communication protocols, messaging, and presentation used between alarm manager systems and alarm dissemination and alarm endpoint client systems is not within the scope of this profile.

Systems covered by this document shall pass through rather than modify alarms created by patient care devices, and shall not create additional alarms based on interpreting alarms or based
230 on correlating alarms from different alarm reporting systems.

There was consensus that snippets from ECG or other physiological waveforms associated with alarms were desirable to provide for in this document, but it was decided to define that in a separate format specification, Waveform Content Module (WCM). Inclusion of Waveform Content Module (WCM) components in ACM Report Alarm [PCD-04] messages is the direction

235   going forward, once sufficient vendors have produced WCM conformant implementations for
the ACM AR, AM, and AC actors.

Volume 1 – Integration Profiles

240 *This section describes the changes required in Volume 1 of the Technical Framework that result from including this Integration Profile.*

1.7 History of Annual Changes

The Alarm Communication Management integration profile defines the communication of alarms from alarm source systems to alarm manager systems and from alarm manager systems to
245 alarm communicator systems.

Add the following bullet to the end of the bullet list in section 1.7

- Added the ACM Profile which defines the communication of alarms from alarm source systems to alarm manager systems and from alarm manager systems to alarm communicator systems.
250 - Integrated PCD domain approved Change Proposals (CP) from 2010-2011 cycle, including housekeeping updates and changes, changes in HL7 events and triggers in preparation for HL7 versions 2.7 and 2.8, addition of WCTP as a protocol choice between the AM and AC actors, integration of WCM content into PCD-04 and PCD-06 transactions, addition of optional PIN/Carrier recipient specification on PCD-04 transaction.
255 - Integrated PCD domain approved Change Proposals (CP) from the 2011-2012 cycle, including housekeeping updates and changes, removal of SMTP as an optional choice for the AM - AC communication protocol for the PCD-06 Disseminate Alarm and PCD-07 Report Dissemination Alarm Status transactions leaving WCTP as the only permissible AM – AC communication protocol, removal of the Alarm Archiver (AA) actor and its two related
260 transactions PCD-08 Subscribe to Alarm and PCD-11 Report Alarm to Archiver to expedite migration of the ACM profile into the PCD Technical Framework in the next cycle. If Alarm Archiver-like functionality is required please examine the Asynchronous Data Query (ADQ) profile and specifically the Device Data Archiver (DDA).

265 *Add the following section to Table 2-1 Integration Profiles Dependencies in section 2.1*

Required Profiles	<?>	<?>	<->
ITI Consistent Time (CT)			
Related Profiles			
Patient Identifier Cross Referencing (PIX) Profile			
Patient Demographics Query (PDQ)			
Waveform Content Module (WCM)			

Add the following section to section 2.2

2.2.X ACM Integration Profile

270 This is an alarm distribution solution providing the following:

- Communication of alarms from reporting devices to concentrating gateways
- Communication from the gateway to an alarm manager or distributor
- Communication to an alarm communicator for dissemination to people using both wired and wireless communication devices, typically clinicians, physicians, or other healthcare staff, for
275 responding to patient needs or related workflows
- Communication of status updates and responses from people back to the alarm manager to the alarm reporter for delivery confirmation

The section shall be added to Volume 1

X Alarm Communication Management (ACM) Integration Profile

280 Alarm Communication Management defines the communication of alarms from alarm source systems to alarm manager systems and from alarm manager systems to alarm communicator systems.

This is an alarm distribution solution providing the following:

- Communication from the gateway to an alarm manager or distributor
285 - Communication to an alarm communicator for dissemination to people using both wired and wireless communication devices, typically clinicians, physicians, or other healthcare staff, for responding to patient needs or related workflows
- Communication of status updates and responses from people back to the alarm manager to the alarm reporter for delivery confirmation

290   The intended use of the IHE PCD Alarm Communications Management Profile is to serve in
communication of alarm information from patient care devices to an alarm manager system
communicating with additional means of notification to caregivers. Notification devices would
include those capable of supporting this profile, in particular PCD-06 and PCD-07.

295

Communication detailed in this profile

Communication not detailed in this profile
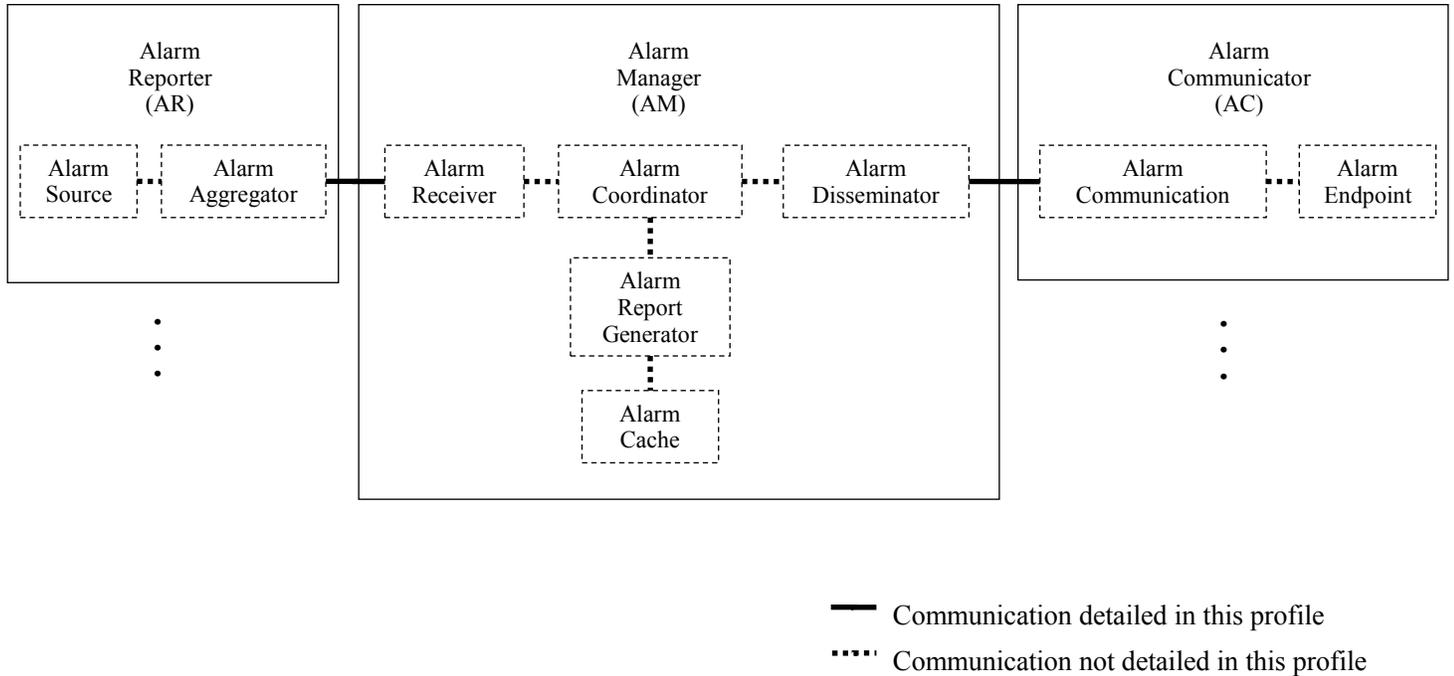
Figure X-1: ACM Profile Actor Diagram

Out of Scope

Grouping or consolidation of alarms is out of scope for this profile.

300   The definition of escalation actions in response to a notification not being responded to are
outside the scope of this profile.

X.1 Actors/ Transactions

Figure X-1 shows the actors directly involved in the ACM Integration Profile and the relevant
transactions between them. Other actors that may be indirectly involved due to their
305   participation in other related profiles, etc. are not necessarily shown.

Table X.1-1 lists the transactions for each actor directly involved in the ACM Profile. In order to
claim support of this Integration Profile, an implementation must perform the required

transcions (labeled "R"). Transactions labeled "O" are optional. A complete list of options
defined by this Integration Profile and that implementations may choose to support is listed in
310   Volume 1, Section X.2.

Table X.1-1: ACM Integration Profile – Actors and Transactions

Actors	Transactions	Direction	Optionality	Section in Vol. 2
Alarm Reporter (AR)	Report Alarm [PCD-04]	Outbound	R	3.Y
	Waveform Content Module (WCM) data within [PCD-04]	Outbound	O	3.Y
	Report Alarm Status [PCD-05]	Inbound	O	3.Y+1
Alarm Manager (AM)	Report Alarm [PCD-04]	Inbound	R	3.Y
	Waveform Content Module (WCM) data within [PCD-04]	Inbound	O	3.Y
	Report Alarm Status [PCD-05]	Outbound	O	3.Y+1
	Disseminate Alarm [PCD-06]	Outbound	R	3.Y+2
	Waveform Content Module (WCM) data within [PCD-06]	Outbound	O	3.Y+2
	Report Dissemination Alarm Status [PCD-07]	Inbound	R	3.Y+4
Alarm Communicator (AC)	Disseminate Alarm [PCD-06]	Inbound	R	3.Y+2
	Waveform Content Module (WCM) data within [PCD-06]	Inbound	O	3.Y+2
	Report Dissemination Alarm Status [PCD-07]	Outbound	R	3.Y+4

X.2 ACM Integration Profile Options

Options that may be selected for this Integration Profile are listed in the table X.2-1 along with
315   the Actors to which they apply. Dependencies between options when applicable are specified in
notes.

Alarm Reporter (AR)	Report Alarm [PCD-04] → ← Report Alarm Status [PCD-05]	Alarm Manager (AM)	Disseminate Alarm [PCD-06] →	Alarm Communicator (AC)

← Report Dissemination Alarm Status [PCD-07]
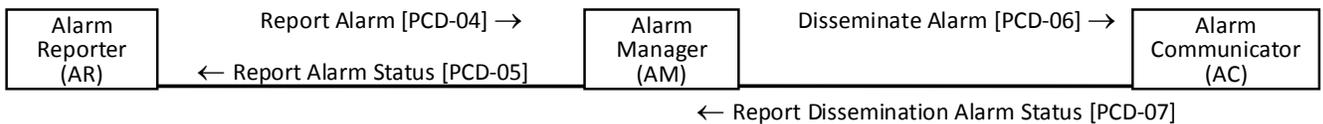
Table X.2-1: ACM – Actors and Options

Actor	Options	Vol. & Section
Alarm Reporter (AR)	Report Alarm Status option	3.Y+1
	Identify Recipients option	3.Y+1
	Waveform Content Module (WCM) option	3.Y+1
Alarm Manager (AM)	Report Alarm Status option	3.Y+1
	Identify Recipients option	3.Y+1
	Waveform Content Module (WCM) in PCD-04 option	3.Y+1
	Waveform Content Module (WCM) in PCD-06 option	3.Y+1
Alarm Communicator (AC)	Waveform Content Module (WCM)	3.Y+1

320 The Report Alarm Status option indicates whether or not the particular actor supports the Report Alarm Status transaction (PCD-05).

The Identify Recipients option for the Alarm Reporter identifies whether or not the Report Alarm transaction (PCD-04) might include the identification of the notification recipient people or devices.

325 The Identify Recipients option for the Alarm Manager identifies whether or not the Alarm Manager sends to the Alarm Reporter notification recipient details as to people or devices notified and replies.

X.3 ACM Use Cases and Interaction Diagrams

Alarm Communication Management is meant to improve clinical efficiency by using technology
330 to deliver the right alarms, with the right priority, to the right individuals via devices with the right content, and through configuration escalating communication of alarms to devices associated with other individuals.

The following are the use cases. The use cases are noticeably generic and not so much focused on the alarm clinical purpose as they are focused on the system interactions. The use cases may
335 be directly applicable to other IHE domains, and may be supplemented with additional use cases to serve specific needs in other domains.

X.3.1 Case A1: Location Sourced

Use Case – Patient wants a pillow. Patient pulls nurse call. Nurse call system lights the room's dome light and light at central station. Nurse call system, operating as an Alarm Reporter (AR)
340 actor sends Report Alarm [PCD-04] to Alarm Manager (AM) indicating nurse call alarm. The Alarm Manager (AM) logs receipt of the alarm. The Alarm Manager (AM) identifies the appropriate nurse based upon configured nurse to patient assignments, identifies the appropriate Alarm Communicator (AC) actor and destination communication device based upon nurse to device configuration in Alarm Manager (AM), sends Disseminate Alarm [PCD-06] to nurse's

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Case A1: Location Sourced
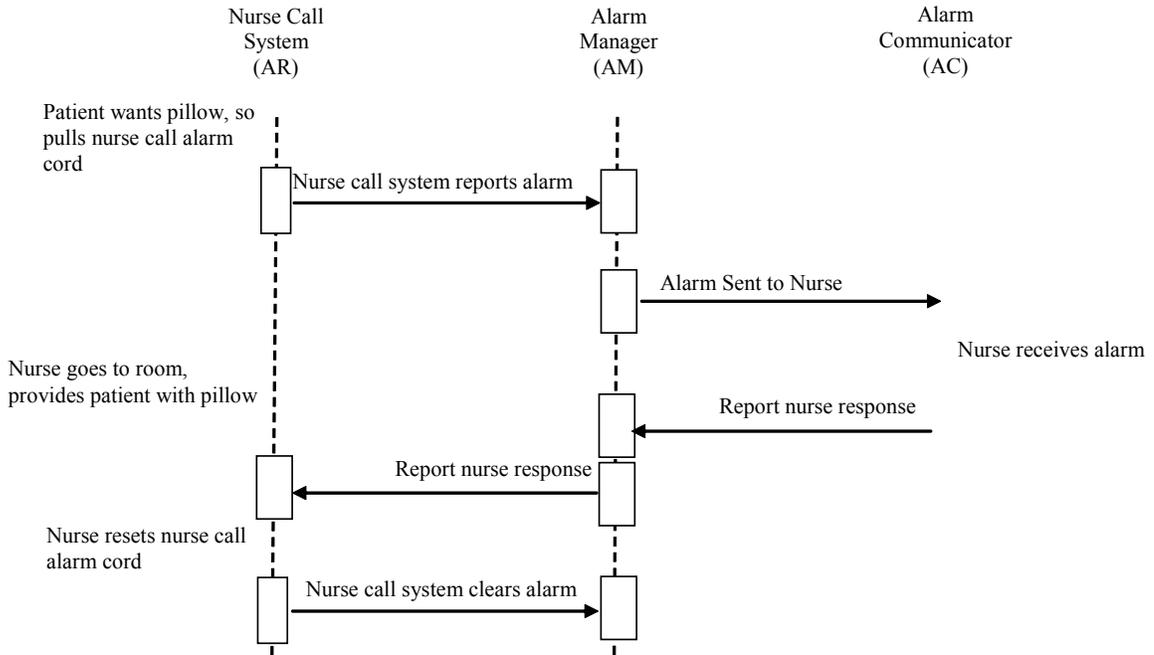
345   communication device. The Alarm Manager (AM) logs the dissemination to the Alarm
       Communicator (AC). The nurse receives the alarm on their assigned device. The information
       minimally includes the patient location (room number). The nurse replies to the alarm on the
       communication device, the Alarm Communicator (AC) sends a Report Dissemination Alarm
       Status [PCD-07] to the Alarm Manager (AM). The Alarm Manager sends a Report Alarm Status
350   [PCD-05] to the Alarm Reporter (AR). The nurse goes to the room, determines the needs of the
       patient, and provides the patient with a pillow. The nurse then resets the nurse call pull. The
       nurse call system turns off the room's dome light and the light at the central station. The nurse
       call system, operating as an Alarm Reporter (AR) actor sends Report Alarm [PCD-04] to Alarm
       Manager (AM) indicating reset of the nurse call alarm. The Alarm Manager (AM) receives the
355   alarm turns off any configured alarm escalation and logs the alarm.

X.3.2 Case A2: Identified Patient Source

Use Case – Alarm occurs on PCD assigned to patient. PCD or PCD gateway system, operating
as an Alarm Reporter (AR) actor sends Report Alarm [PCD-04] to Alarm Manager (AM)
360   indicating PCD alarm. The Alarm Manager (AM) logs receipt of the alarm. The Alarm
       Manager (AM) identifies the appropriate nurse based upon configured nurse to patient
       assignments, identifies the appropriate Alarm Communicator (AC) actor and destination

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Case A2: Identified Patient Source
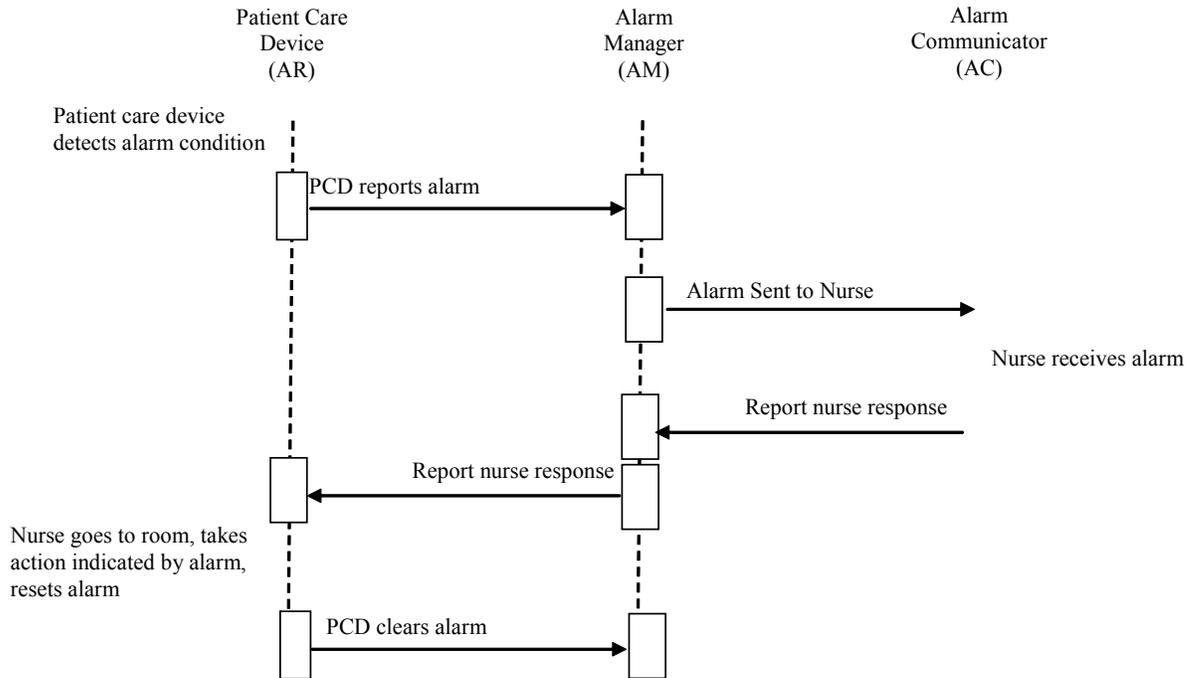
communication device based upon nurse to device configuration in Alarm Manager (AM), sends Disseminate Alarm [PCD-06] to nurse's communication device. The Alarm Manager (AM) logs
365   the dissemination to the Alarm Communicator (AC). The nurse receives the alarm on their assigned device. The information minimally includes the patient identification. The nurse replies to the alarm on the communication device, the Alarm Communicator (AC) sends a Report Dissemination Alarm Status [PCD-07] to the Alarm Manager (AM). The Alarm Manager sends a Report Alarm Status [PCD-05] to the Alarm Reporter (AR). The nurse goes to the room,
370   determines the needs of the patient, and responds to the PCD alarm. The nurse then clears the PCD alarm. The PCD or PCD gateway system, operating as an Alarm Reporter (AR) actor sends Report Alarm [PCD-04] to Alarm Manager (AM) indicating reset of the PCD alarm. The Alarm Manager (AM) receives the alarm turns off any configured alarm escalation and logs the alarm.

X.3.3 Case A3: Same as A1/A2 with Escalation with Cancel at Alarm Source

375   Use Case 3: (same as use case 1 or 2 with escalation with cancel at source) if the communication destination is inaccessible or the target individual is indicated as unavailable, then the alarm is rerouted to one or more alternatives with escalation to higher levels of responsibility until the alarm is canceled at its source and the alarm system notified of the cancel.

X.3.4 Case A4: Same as A1/A2 with Escalation with Cancel at Communication Endpoint

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Use Case 4: (same as use case 1 or 2 with escalation with cancel of any active Alarm Manager (AM) escalation actions at communication endpoint) if the communication destination is inaccessible or the target individual is indicated as unavailable then the alarm is rerouted to one or more alternatives with escalation to higher levels of responsibility until the alarm is canceled

385   by a recipient at a communication endpoint.

X.3.5 Case A5: Same as A1/A2 with Escalation with Cancel at AM

Use Case 5: (same as use case 1 or 2 with escalation with cancel of any active Alarm Manager (AM) escalation actions at alarm mgmt. system) if the communication destination is inaccessible or the target individual is indicated as unavailable then the alarm is rerouted to one or more

390   alternatives with escalation to higher levels of responsibility until the alarm is canceled by a user on the Alarm Manager (AM), however not automatically via algorithms in the Alarm Manager (AM).

X.3.6 Case A6: Information with no destination other than logging by the Alarm Manager (AM) actor

395   Use Case 6: The use case for this is to log information from the Alarm Reporter (AR) with the Alarm Manager (AM) and not to disseminate the information to the Alarm Communicator (AC). The information can be information meant to be used in concert with alarms received from the Alarm Reporter (AR), or for logs or information not meant for dissemination to users, but used in reporting alarm environment after the fact.

400   ### X.3.7 Case A7: Equipment Sourced Alarm

Use Case 7: The use case for this alarm is to communicate medical equipment management events from devices when those events are not patient focused, such as battery low or failure to charge or malfunctioning of alarms. Such events are device specific, patient independent, and potentially location independent.

405   ## X.4 ACM Security Considerations

This profile itself does not impose specific requirements for authentication, encryption, or auditing, leaving these matters to site-specific policy or agreement. The IHE PCD Technical Framework identifies security requirements across all PCD profiles.

<Appendix A> Actor Summary Definitions

410   Communication between the actors is covered in this profile. Communication between functional units within an actor is not covered in this profile.

Alarm Reporter – The Alarm Reporter (AR) actor sources the alarm to Alarm Manager (AM).

15

Alarm Manager – The Alarm Manager (AM) actor receives the alarm from the Alarm Reporter
(AR), potentially analyzes the alarm, and dispatches the alarm to the Alarm Communicator (AC).

415 **Alarm Communicator** – The Alarm Communicator (AC) actor receives the alarm from the
Alarm Manager (AM) and sends the alarm to the client application in the endpoint device.

The Alarm Communicator (AC) actor is not responsible for taking action in the event that the
endpoint operator has received but not responded to the notification. Actions for non-response
by the Alarm Communicator (AC) endpoint operator (clinical user) are within the scope of the
420 Alarm Manager (AM) actor. These actions are commonly referred to as escalation whether it is
repeatedly sending the same message to the same recipient or to alternate recipients. The
definition of such actions has been identified as out-of-scope for the ACM profile.
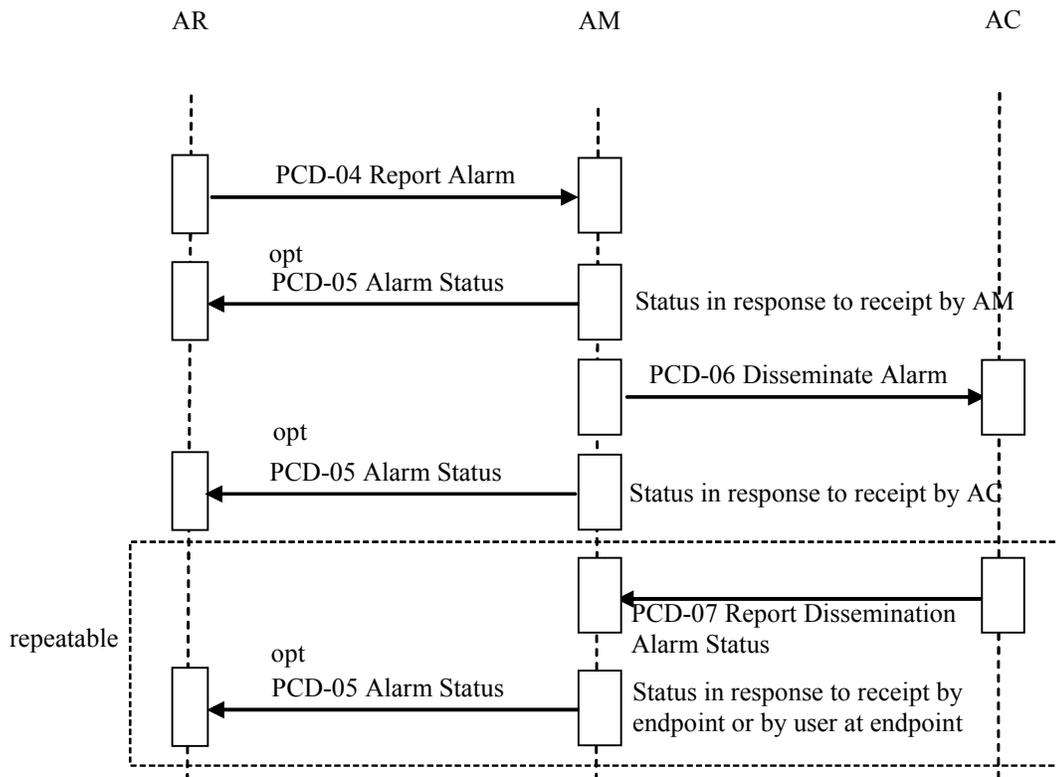
Figure X.2-1: Basic Process Flow in ACM Profile

425

Each actor is identified below. Actor identity is implicitly identified in the alarm (for example, through MSH-21 Message Profile, identifying the message as PCD-04 by OID, which is sent by an ACM AR actor, which is identified in MSH-3 Sending Application).

430 The functional units comprising an actor may be provided by one or more vendors in one or more systems. Reducing the total number of systems is preferred, but is not required.

Data flow of individual use model messaging communication indicates the command response sequences and directions.

435 **Alarm Reporter (AR) Actor**

This actor originates the alarm.

The semantics and data types used to represent alarm type, alarm priority, alarm inactivation state and escalation and de-escalation of priority in the messages of this actor are based on IEC 60601-1-8 definitions.

440 A single source can produce multiple, possibly concurrent, alarms.

A single Report Alarm transaction can contain at most a single alarm.

This profile specifies the required data and data types produced by this actor.

This profile specifies communication of the data produced by this actor.

This actor may optionally cancel an outstanding alarm condition.

445   This may optionally indicate cancellation of any related escalation.

An outstanding alarm condition may be optionally escalated via follow-on alarm.

This actor may aggregate and adapt alarms from multiple sources as needed to make them interoperable with the AM actor. It does not need to be the original source of the alarm data.

In large alarm source populations, an aggregation system may be useful for concentration and
450 possible alarm coordination (smart alarming).

Alarm Manager (AM) Actor

This actor receives alarms from the AR, manages them, and dispatches them to the AC actor.

The semantics and data types used to represent alarm type, alarm priority, alarm inactivation state and escalation and de-escalation of priority in the messages of this actor are based on IEC
455 60601-1-8 definitions.

This profile specifies the required data and data types produced by this actor in communication with the AC and AR actors.

If the following is performed, it is likely performed within the AM.

     Alarm formatting for dissemination

460   Alarm harmonization across multiple similar and dissimilar AR

Any additional alarm priority actions following any performed by the AR

Alarm mapping to AC actor endpoints,

Additional recipients are optionally indicated in the Report Alarm [PCD-04] transaction

Alarm dissemination escalation

465   Alarm dissemination sequencing to AC actor endpoints

Alarm dissemination escalation to AC actor endpoints

Location to staff assignments

Patient identification to staff assignments

Equipment to patient to staff assignments

470   Staff to AC actor endpoint assignments

Alarm reporting

Alarm caching

To accomplish assignments the AM may receive HL7 ADT or SCH message feeds from one or more sourcing systems for the following purposes:

475   Identify patients

Assign resources to patients (staff, equipment, rooms)

This profile specifies the required data and data types produced by this actor.

The protocol used in the communication of the data to/from the Alarm Manager (AM) actor and the Alarm Communicator (AC) actor is the Wireless Communication Transfer Protocol (WCTP).

480 **Alarm Communicator (AC) Actor**

The Alarm Communicator (AC) actor receives alarms from the Alarm Manager (AM) actor. Endpoint devices are connected either directly or indirectly to the Alarm Communicator (AC) actor. The Alarm Communicator (AC) may utilize a locally controlled or public infrastructure.

The protocol for communication between the Alarm Manager (AM) and the Alarm
485 Communicator (AC) is WCTP.

This profile does not specify the protocol used in the communication of the data to the final destination as it is potentially not controllable by the Alarm Communicator (AC).

This profile does not specify the presentation of the data at the endpoint as that is beyond its control.

490 This profile does not specify the human interface at the endpoint as that is beyond its control.

This profile does make recommendations as to the significant data items to be included in alarm notifications with consideration for ePHI (electronic Patient Healthcare Information). The correlation of what data items are to be sent for specific alarms is defined in IHE PCD Device Profiles in conjunction with alarm inclusion in the IHE PCD Rosetta Terminology Mapping (RTM) activities.

It is recognized that in healthcare communication there are certain data items which should not be transported over unsecured and unencrypted communication connections. A number of controls come into play including HIPAA requirements and ePHI guidelines. It is the responsibility of the deploying parties to insure that capabilities are put into place and monitored to assure that information protection requirements are met.

WCTP was originally defined by the Personal Communications Industry Association (PCIA) consortium. The PCIA is not an SDO and is not at this time actively sustaining or enhancing WCTP. WCTP is in popular and stable use by a number of wide area communication service providers. The protocol provides the capabilities required by AM to AC communication, specifically Internet common practice recognized HTTP or HTTPS securable application to application communication, reliable TCP/IP transport, extensible XML data envelope, transactions for application to individual person communication, and communication status responses for closed loop confirmations for delivery to Alarm Communicator (AC), delivery to endpoint device, read by device operator, and operator responses. With permission from the PCIA, this IHE PCD ACM profile includes and adopts version 1.3 update 1 of the WCTP protocol as defined by PCIA at www.wctp.org for use in Alarm Manager (AC) to Alarm Communicator (AC) communication. Corrections and extensions to this capture of the protocol are the responsibility of the Alarm Communication Management (ACM) Working Group (WG) within the Patient Care Devices (PCD) domain of IHE. As the protocol has been in live operation with major communication carriers for some time the risk of changes required for corrective actions is perceived as low. The protocol includes defined areas for client-server agreed two-party extensions. The ACM profile will make use of that capability as needs arise.

Not all of the WCTP protocol possible request/response transactions are required for Alarm Manager (AM) to Alarm Communicator (AC) communication. Later sections of this document identify the specifics.

<Appendix B> Transaction Summary Definitions

No transactions are defined by this profile

GLOSSARY

525   **ACM** – Alarm Communication Management

Physiological alarm – an alarm reflecting the physiological state of the patient (such as a heart rate above or below a caregiver-specified safe range for the patient).

Technical alarm – an alarm reflecting the state of the patient care device itself that may require action from caregivers (such as ECG leads off the patient).

530

Volume 2 - Transactions

Add sections 3.Y

535 In anticipation of HL7 2.8 item 625, Add Alert Trigger Event, this profile is making forward looking use of the triggers and events from that item, specifically the use of ORU^R40 for [PCD-04], and ORA^R41 [PCD-05], and the Participation Information (PRT) segment which is in 2.7. The ORA event is Observational Report – Application Acknowledgement.

3.Y PCD-04 Report Alarm

This section corresponds to Transaction PCD-04 of the IHE Technical Framework. Transaction PCD-04 is used by the Alarm Reporter and the Alarm Manager (AM) actor.

540 ### 3.Y.1 Scope

This transaction is used by the Alarm Reporter to report alarms to the Alarm Manager (AM). The Alarm Reporter (AR) sends alarms to the Alarm Manager (AM) actor in an unsolicited manner.

3.Y.2 Use Case Roles

```
┌──────────────────┐                    ┌──────────────────┐
│ Alarm Reporter   │                    │     Alarm        │
│    (AR)          │                    │    Manager       │
│                  │                    │     (AM)         │
└──────────────────┘                    └──────────────────┘
          \                                    /
           \         ╭───────────────╮        /
            _____│ Report Alarm  │_____/
                     ╰───────────────╯
```

545
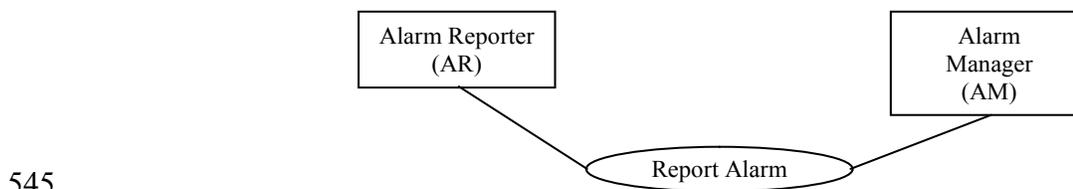
Actor: Alarm Reporter

Role: Sends Report Alarm to the Alarm Manager (AM)

Actor: Alarm Manager (AM)

Role: Receives Report Alarm from Alarm Reporter

550 ### 3.Y.3 Referenced Standards

HL7 - Health Level 7 Version 2.6 Ch7 Observation Reporting

ISO/IEEE 11073-10201 Domain Information Model

ISO/IEEE 11073-10101 Nomenclature

3.Y.4 Interaction Diagrams

555 ### 3.Y.4.1 AR reports to AM

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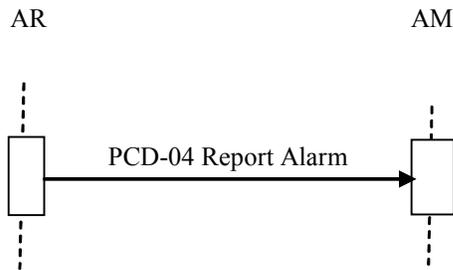
AR sends Report Alarm to AM as an HL7 ORU message.

3.Y.4.1.1 HL7 Conformance Statement

The conformance statement for this interaction described below is adapted from HL7 2.6.

560

Table 3.Y.4.1.1: PCD-04 Transaction Conformance

Publication ID:	R40
Type:	Unsolicited
Publication Name:	IHEPCD-04ReportAlarm
Trigger:	None
Mode:	Immediate
Response:	ORU^R40^ORU_R40
Characteristics:	Sends defined alarm data
Purpose:	Report Alarm from AR to AM
Based on Segment Pattern:	R40

3.Y.4.1.2 PCD-04 Report Alarm (ORU^R40^ORU_R40) static definition

The PCD-04 Report Alarm message is used to communicate ACM data

565   From an Alarm Reporter (AR) to Alarm Manager (AM)

Common HL7 segments are defined in Appendix B Common Message Segments.

Table 3.Y.4.1.2-1: ORU^R40^ORU_R40 HL7 Attribute table

ORU^R40^ORU_R40	ORU Message	Usage	Card.	Section Ref
MSH	Message Header Segment	R	[1..1]	2.15.9
PID	Patient Identification Segment	CE	[1..1]	3.4.2
PV1	Patient Visit Segment	CE	[1..1]	3.4.3
[ORC]	Common Order Segment	O	[0..1]	4.5.1
OBR	Observation Request Segment	R	[1..n]	7.4.1
PRT	Participation Information Segment	O	[0..n]	HL7 2.7 7.4.4
OBX	Observation Result Segment	R	[1..n]	7.4.2
[NTE]	Notes and Comments Segment	O	[0..1]	2.5.10

570   While there can be multiple OBR segments per PCD-04 transaction (in support of inclusion of
other material such as Waveform Content Module (WCM)) there is at most one alarm per PCD-
04 transaction.

Table 3.Y.4.1.2-2: ORU^R40^ORU_R40 Static Definition

ORU^R40^ORU_R40	Report Alarm Message
MSH	Message Header
[{SFT}]	Software Segment
{	--- ALARM_begin
[	--- PATIENT begin
PID	Patient Identification
[	--- LOCATION begin
PV1	Alarm Location
]	--- LOCATION end
]	--- PATIENT end
{	--- ALARM_IDENTIFICATION begin
[ORC]	Alarm Common
{OBR}	Alarm Identification
[{PRT}]	Participation (for observation and direct specification of additional recipients)
[{	--- ALARM_OBSERVATION begin
{OBX}	Alarm observation relative to OBR

ORU^R40^ORU_R40	Report Alarm Message
{ [NTE] }	Notes and Comments
}]	--- ALARM OBSERVATION end
}	--- ALARM_IDENTIFICATION end
}	--- ALARM end

575

A single Report Alarm [PCD-04] transaction contains at most one alarm for a given patient and there must be an OBR preceding each group of OBX segments.

If waveform snippets are to be included in the Report Alarm [PCD-04] transaction, they must be encoded in the HL7 message in accordance with the Waveform Content Module (WCM).

580 **3.Y.4.1.3 Trigger Events**

The AR has arrived at the onset, continuation of, or conclusion an event which may be an alarm and sends it to the AM.

3.Y.4.1.4 Message Semantics

This message is meant to convey from the AR actor to the AM actor the fact that an alarm is
585 occurring, is still occurring, or has ended along with the data related to the alarm to identify the patient and/or location, the alarming condition, and any observations associated with the alarm.

3.Y.4.1.5 Expected Actions

Whether or not the Alarm Manager sends a Report Alarm Status [PCD-05] to the Alarm Reporter is a configuration agreement between the Alarm Reporter and Alarm Manager
590 implementations.

HL7 ACK from the Alarm Manager (AM) actor back to the Alarm Reporter (AR) actor is used to communicate that the Alarm Manager (AM) actor has received the Report Alarm [PCD-04] transaction from the Alarm Reporter (AR) actor. The Report Alarm [PCD-04] is asynchronous to Report Dissemination Alarm Status [PCD-07] transactions by an indeterminate amount of
595 time. HL7 ACK is therefore not used to report dissemination status of the alarm as it would leave the Alarm Reporter (AR) actor awaiting HL7 ACK receipt for an indeterminate amount of time. Status updates as to the dissemination of the alarm are optional and are communicated using the Report Alarm Status [PCD-05] transaction from the Alarm Manager (AM) to the Alarm Reporter (AR).

600 While the AR to AM message [PCD-04] is one message it is likely to result in the potential for many messages from AM to AC and many messages from AC back to AM and from AM back to AR. Communication device operator response delays may result in delays of AC to AM and AM back to AR message delays.

3.Y.4.1.6 Security Considerations

605   This profile does not impose specific requirements for authentication, encryption, or auditing, leaving these matters to site-specific policy or agreement. The IHE PCD Technical Framework identifies security requirements across all PCD profiles.

3.Y+1 PCD-05 Report Alarm Status

610   This section corresponds to Transaction PCD-05 of the IHE Technical Framework. Transaction PCD-05 is used by the Alarm Manager (AM) actor to report alarm status updates to the Alarm Reporter (AR) actor.

3.Y+1.1 Scope

This transaction is used by the Alarm Manager (AM) to report dissemination status updates to
615   the Alarm Reporter. The AM will send only one PCD-05 to the AR, which indicates the success or failure of the AM's communication of the alarm to the AC and the AC's communication of the alarm to the endpoint device.

3.Y+1.2 Use Case Roles

620   **Actor:** Alarm Manager (AM)

Role: Sends Report Alarm Status to Alarm Reporter (AR)

Actor: Alarm Reporter (AR)

Role: Receives Report Alarm Status from the Alarm Manager (AM)

3.Y+1.3 Referenced Standard

625   HL7 - Health Level 7 Version 2.6 Ch. 7 Observation Reporting

ISO/IEEE 11073-10201 Domain Information Model

ISO/IEEE 11073-10101 Nomenclature

26

3.Y+1.4 Interaction Diagrams

3.Y+1.4.1 AM status updates to AR
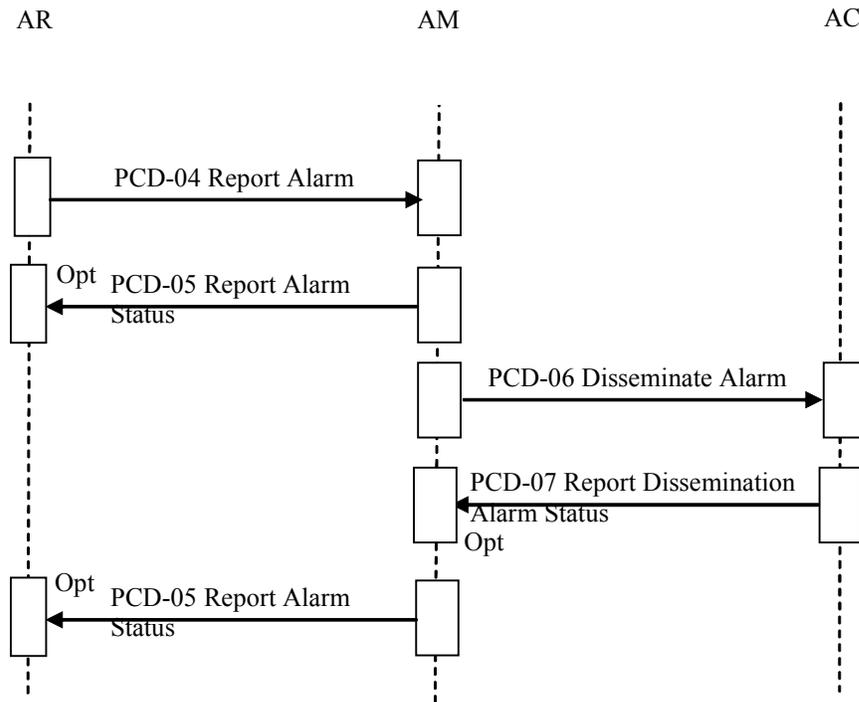
630

The AM sends Report Alarm Status to the AR actor as an HL7 ORA message.

3.Y+1.4.1.1 Trigger Events

The AM has determined either through configuration and contextual data driven decision rules or through receipt of Dissemination Status from the Alarm Communicator that an alarm status update needs to be sent to the AR.

635

AM internal trigger events include the following:

- Accept (not specified, correct)
- Reject (not specified, nuisance but correct, false positive)
- Deliverable, had a mapped destination
640
- Queued to communications
- Undeliverable (AC down or message not deliverable to AC endpoint device)

3.Y+1.4.1.2 Message Semantics

This message is meant to convey from the AM actor to the AR actor the success or failure of the AM and AC to communicate the alarm to the endpoint device.

___

3.Y+1.4.1.3 HL7 Conformance Statement

645

The conformance statement for the interaction described below is adapted from HL7 2.6.

While HL7 2.8 item 625 provides for the Alarm Manager (AM) to send either ORA^R41 or ORA^R42 as Report Alarm Status [PCD-05] to the Alarm Reporter (AR), ORA^R41 as defined in HL7 is not expected to be utilized by vendors as it presumes a guarantee of delivery that the
650   Alarm Manager (AM) and the Alarm Communicator (AC) cannot assure. However, since the IPEC profile uses the R42 event which was originally intended for use by ACM, the ACM profile will use R41 to mean what R42 was originally meant to convey, that being the alarm communication status from the AM back to the AR

The AM and AC cannot provide any level of assurance of delivery of the alarm to the endpoint
655   device. This lack of assurance of delivery is based upon the predominant use by healthcare of cost conscious one-way fire-and-forget pagers.

The PCD-04 message will presume a default filter for PCD-05 notifications so that only "delivered to one or more recipients" or "not successfully delivered to any recipients" will be the only notifications that the AR actor has to handle. This avoids the AM back to AR fire hose for
660   all device specific notification activity details for all devices to which a notification is delivered. This also avoids the requirement for a filter segment in the PCD-04 message. In an R41 the Participation Information (PRT) segment PRT-4 field AAP (Alert Acknowledging Provider) is used to indicate the identity of the user to which the alert has been delivered and acknowledged.

665   **Table 3.Y+1.4.1.3-1: Transaction Conformance**

Publication ID:	R41
Type:	Unsolicited
Publication Name:	IHEPCD-05ReportAlarmStatus
Trigger:	None
Mode:	Immediate
Response:	ORA^R41^ORA_R41
Characteristics:	Sends alarm status data
Purpose:	Provide alarm status from AM to AR
Based on Segment Pattern:	R41

3.Y+1.4.1.4 PCD-05 Report Alarm Status (ORA^R41^ORA_R41) static definition

The PCD-05 Report Alarm Status message is used to communicate ACM messaging status from an Alarm Manager (AM) to Alarm Reporter (AR)

Common HL7 segments are defined in Appendix B Common Message Segments.

670   Device Technical Framework and Appendix C Common Data Types.

Table 3.Y+1.4.1.4.-1: ORA^R42^ORA_R42 static definition

ORA^R42^ORA_R42	ORU Message	Usage	Card.	Section Ref
MSH	Message Header Segment	R	[1..1]	2.15.9
PID	Patient Identification Segment	CE	[1..1]	3.4.2
PV1	Patient Visit Segment	CD	[1..1]	3.4.3
[ORC]	Common Order Segment	O	[0..1]	4.5.1
OBR	Observation Request Segment	R	[1..n]	7.4.1
[PRT]	Participation Information Segment	O	[0..n]	HL7 2.7 7.4.4
OBX	Observation Result Segment	R	[1..n]	7.4.1
[NTE]	Notes and Comments Segment	O	[0..1]	2.5.10

While there can be multiple OBR segments per transaction there is at most one alarm on which
status is reported per transaction.

3.Y+1.4.1.5 Expected Actions

AR takes appropriate action based upon alarm status update.

3.Y+1.4.1.6 Security Considerations

This profile does not impose specific requirements for authentication, encryption, or auditing,
leaving these matters to site-specific policy or agreement. The IHE PCD Technical Framework
identifies security requirements across all PCD profiles.

3.Y+2 PCD-06 Disseminate Alarm

This section corresponds to Transaction PCD-06 of the IHE Technical Framework. Transaction
PCD-06 is used by the Alarm Manager (AM) actor to disseminate alarms to the Alarm
Communicator (AC) actor.

3.Y+2.1 Scope

This transaction is used by Alarm Manager (AM) to disseminate the alarm to the Alarm
Communicator (AC).

3.Y+2.2 Use Case Roles
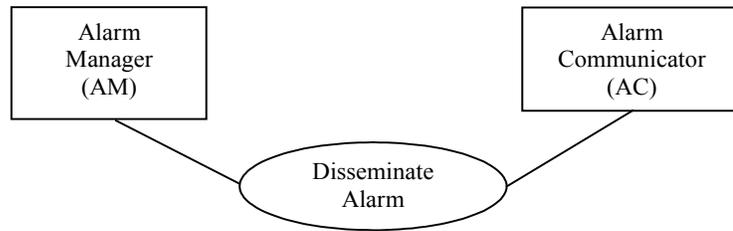
690 **Actor:** Alarm Manager (AM)

Role: Sends Disseminate Alarm to Alarm Communicator (AC)

Actor: Alarm Communicator (AC)

Role: Receives Disseminate Alarm from the Alarm Manager (AM)

3.Y+2.3 Referenced Standard

695 The communication protocol between the AM and AC actors is WCTP. The communicated data items are in scope for this profile. The correlation of what data items are to be sent for specific alarms is defined in IHE PCD Device Profiles in conjunction with alarm inclusion in the IHE PCD Rosetta Terminology Mapping (RTM) activities.

While alarm related data items available to the AM is specified in this profile the ability of
700 individual communication devices to communicate, display, or respond to those data items are dependent upon the product capabilities and site specific configuration of the AC actor, the communication device, and the available communication infrastructure.

WCTP version 1.3 update 1 is as captured by this profile.

ISO/IEEE 11073-10201 Domain Information Model

705 ISO/IEEE 11073-10101 Nomenclature

3.Y+2.4 Interaction Diagrams

3.Y+2.4.1 AM disseminate alarm to AC
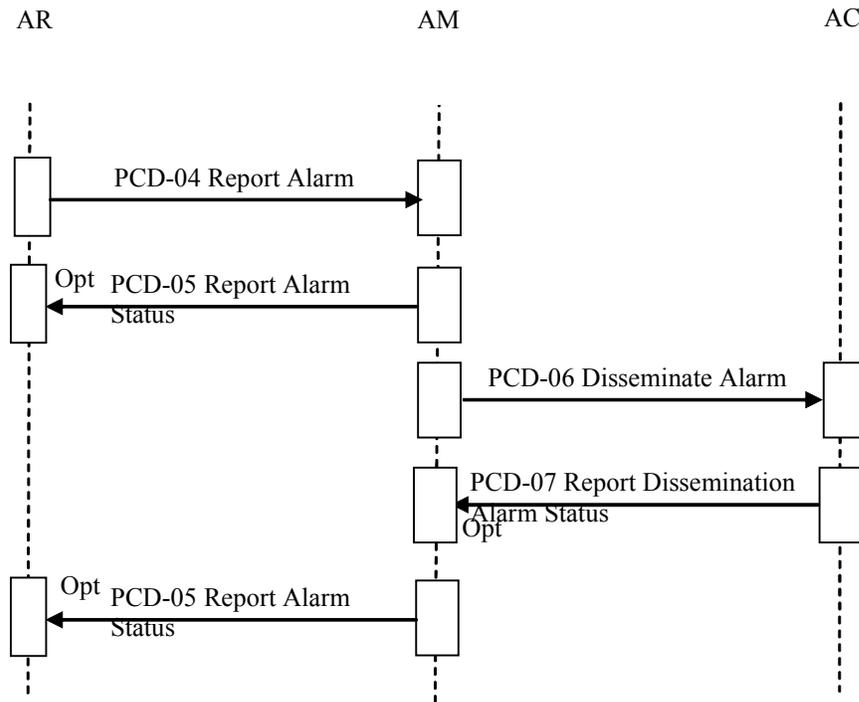
AM sends Disseminate Alarm to AC. The protocol between the AM and AC actors is WCTP.

3.Y+2.4.1.1 HL7 Conformance Statement

The communication protocol is WCTP. There is no specified HL7 conformance.

3.Y+2.4.1.2 PCD-06 Disseminate Alarm static definition

The PCD-06 Disseminate Alarm message is used to communicate ACM data from an Alarm
Manager (AM) to the Alarm Communicator (AC).

The text message within the PCD-06 transaction is meant to be readily recognized and acted
upon by people. Cryptic encodings are to be avoided. Lengthy messages containing excessive
amounts of unnecessarily detailed information are also to be avoided. Most communication
device displays are limited in size. Long messages requires scrolling to review the entire
message before acting upon it to make sure that no pertinent information is missed.

Additionally the information, if sent to an endpoint communication device which lacks
authentication and encryption should be examined to avoid sending electronic patient healthcare
information over such a connection and thereby exposing patient information.

If the PCD-06 includes a human readable text description of the alarm indication that is the
preferred description to be presented on the wireless endpoint communication device. In the
725   absence of such information the Alarm Manager should produce the human readable text
description from other information present in the transaction.

If waveform snippets in Waveform Content Module (WCM) format are included in the Report
Alarm [PCD-04] transaction and the AM to AC protocol is WCTP then then the entire Report
Alarm [PCD-04] message shall be included in a single extension XML element within the
730   WCTP message body. This approach provides the maximum relevant data for the AC to process
and display the evidentiary data.

If during communication negotiations between the AM and AC actors the AC actor indicates no
readiness to produce graphics from the evidentiary data then that information is not to be sent to
the AC and instead the AM, if a regulated medical device and if capable, should send a graphical
735   snippet prepared from the evidentiary data received in the Report Alarm [PCD-04] transaction.

3.Y+2.4.1.3 Trigger Events

The AM has determined that an alarm needs to be disseminated and so sends it to the AC.

3.Y+2.4.1.4 Message Semantics

This message communicates alarms to communication endpoint devices.

740   The table below lists the data items and their optionality. All of these data items are within the
WCTP message text.

Table 3.Y+2.4.1.4-1: PCD-06 static definition

PCD-06	Fields	Usage	Card.
Alarm_Location	Alarm associated location based upon information from PV1-3	CE	[1..1]
Alarm_Patient	Patient Identification	CE	[1..1]
Alarm_Text	Textual alarm identification	R	[1..1]
Alarm_Identifier	Alarm unique identifier	O	[0..1]
Alarm_Callback	Call back connection information	O	[0..1]
Alarm_Reference	URL or application link potentially containing alarm or patient contextual information	O	[0..1]
Alarm_Comment	Notes and Comments associated with alarm	O	[0..1]
Alarm_Evidentiary_Data	Evidentiary data associated with alarm,	O	[0..1]

PCD-06	Fields	Usage	Card.
	e.g., waveform data See appendix for WCTP messaging information		
Alarm_Evidentiary_Graphic	Evidentiary data transformed into a graphical image (SVG and/or PNG) See appendix for WCTP messaging information.	O	[0..1]

3.Y+2.4.1.5 Expected Actions

745 AC sends alarm to endpoint. If the endpoint is a group then the AC is expected to send the alarm notification to all members of the group.

3.Y+2.4.1.6 Security Considerations

This profile while utilizing communication capabilities supportive of authentication, encryption, or auditing, does not impose specific requirements leaving these matters to site-specific policy or
750 agreement. The IHE PCD Technical Framework identifies security requirements across all PCD profiles.

3.Y+3 PCD-07 Report Dissemination Alarm Status

This section corresponds to Transaction PCD-07 of the IHE Technical Framework. Transaction PCD-07 is used by the Alarm Communicator actor to signal dissemination status updates and
755 replies to the Alarm Manager (AM).

3.Y+3.1 Scope

This transaction is used by Alarm Communicator to report one or more dissemination status updates and/or replies to the Alarm Manager (AM). A single PCD-06 transaction from the AM to the AC can result in numerous PCD-07 transactions from the AC back to the AM.

760 **3.Y+3.2 Use Case Roles**

___

33
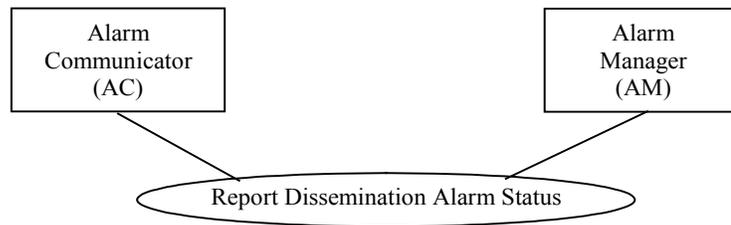
Actor: Alarm Communicator (AC)

Role: Sends Dissemination Status to the Alarm Manager (AM)

Actor: Alarm Manager (AM)

765 **Role:** Receives Dissemination Status from the Alarm Communicator (AC)

3.Y+3.3 Referenced Standard

The communication protocol is WCTP, the same as for the Disseminate Alarm [PCD-06] transaction. The communicated data items are in scope for this profile.

WCTP version 1.3 update 1 is as captured by this profile.

770 ISO/IEEE 11073-10201 Domain Information Model

ISO/IEEE 11073-10101 Nomenclature

3.Y+3.4 Interaction Diagrams

3.Y+3.4.1 AC status updates to AM
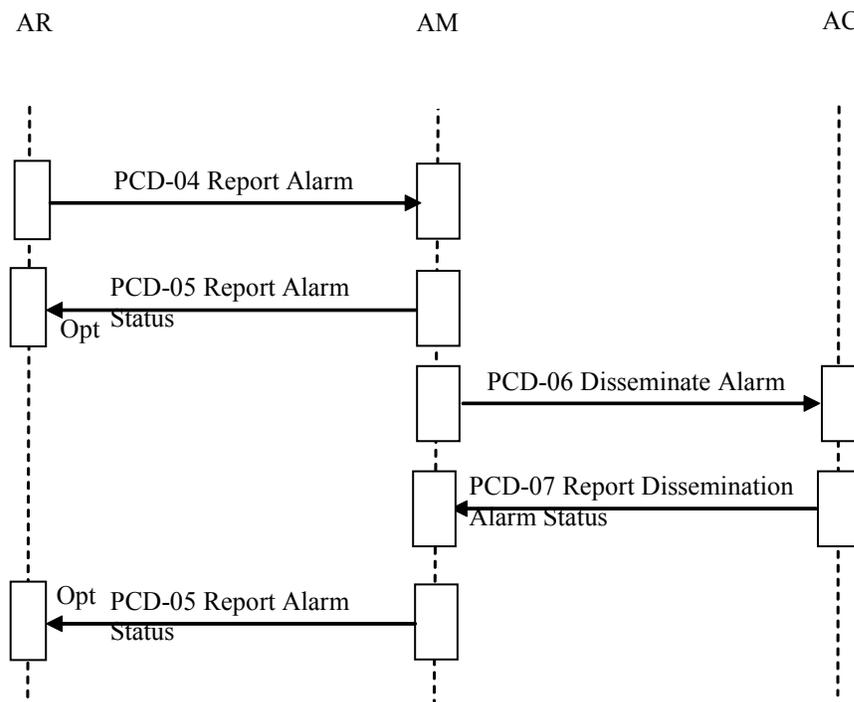
775 The AC sends Dissemination Status to the AM actor. The protocol utilized is WCTP.

3.Y+3.4.1.1 Trigger Events

The AC has determined a dissemination status update needs to be sent to the AM.

The following table lists the results of the dissemination from the AC back to the AM for
optional relay back to the AR using the PCD-05 transaction. The required Communication
780   Status Enumerations are indicated.

Table 3.Y+3.4.1.1-1: Status Enumerations

Usage	Communication Status Enumeration
R	Received by communications (accepted by WCTP gateway)
O	Undeliverable to endpoint Optional in support of one-way devices, such as pagers.
O	Delivered to endpoint Optional in support of one-way devices, such as pagers.
O	Read at endpoint Optional in support of one-way devices, such as pagers.
O	Accepted by endpoint Optional in support of one-way devices, such as pagers.
O	Accepted by endpoint as true positive
O	Accepted by endpoint as true positive however not clinically relevant
O	Accepted by endpoint as false positive
O	Rejected by endpoint Optional in support of one-way devices, such as pagers.
O	Cancelled by endpoint
O	Cancelled by other than endpoint
O	Callback start at endpoint See appendix for WCTP messaging details. Optional as not supported by all notification devices.
O	Callback end at endpoint See appendix for WCTP messaging details. Optional as not supported by all notification devices.
O	Completed by endpoint operator Optional in support of one-way devices, such as pagers.

A single PCD-04 to PCD-06 transaction may go through multiple communications status updates
as the alarm is communicated to the endpoint user or application. Which of the status updates
785   are possible is AC actor and endpoint implementation dependent. Some endpoint devices are
output only and do not support two-way capabilities. Some devices and services offer
transmission confirmation. More advanced communications endpoints offer two-way
capabilities allowing the operator of the endpoint to accept or cancel the alarm.

790 Detailed reason for status can optionally be included to encompass the concept of presence (see WCTP interface specification) to allow for messages not making it to the endpoint or being rejected by the endpoint due to a presence state such as offline, busy, or do not disturb.

3.Y+3.4.1.2 Message Semantics

This message is used to communicate status updates on the communication of an alarm to endpoints. See appendix for WCTP messaging specifics.

795 **3.Y+3.4.1.3 HL7 Conformance Statement**

The communication protocol is WCTP. There is no specified HL7 conformance.

3.Y+3.4.1.4 PCD-07 Report Dissemination Alarm Status static definition

The PCD-07 Dissemination Status message is used to communicate ACM messaging status and replies from an Alarm Communicator (AC) to Alarm Manager (AM)

800 The Alarm Communicator (AC) actor is not responsible for indicating that the endpoint operator has received but not responded to the notification – as in received sending delivered to device status, automatically displayed which may or may not send back read indication, but no operator interaction. Actions for non-response by the Alarm Communicator (AC) endpoint operator (clinical user) (escalation or sending to alternate devices) is within the scope of the Alarm
805 Manager (AM) actor. Such actions have been identified within the ACM Trial Implementation as out of scope for the ACM profile.

The endpoint device message communication protocol between the Alarm Communicator and the endpoint device is outside the scope of the profile. The data presentation by the endpoint
810 device is outside the scope of the profile.

The table below lists the data items and their optionality.

Table 3.Y+3.4.1.4-1: PCD-07 static definition

PCD-07	ORU Message	Usage	Card.
Alarm_Identifier	Alarm unique identifier (see PCD-06)	R	[1..1]
Alarm_Status	Communication Status Enumeration item	R	[1..1]

815 **3.Y+3.4.1.5 Expected Actions**

The AM may send the Report Alarm Status [PCD-05] to the Alarm Reporter (AR) as a result of Alarm Manager (AM) receipt of this message.

36

3.Y+3.4.1.6 Security Considerations

820 This profile while utilizing communication capabilities supportive of authentication, encryption, or auditing, does not impose specific requirements leaving these matters to site-specific policy or agreement. The IHE PCD Technical Framework identifies security requirements across all PCD profiles.

3.Z Common Message Segments

825 The following descriptions rely on IHE PCD Technical Framework Appendix B Common Message Segments and A.1 Mapping ISO/IEEE 11073 Domain Information Model to HL7. All provisions of those referenced sections should be assumed to apply also to Alarm Communications Management. The additional information in this document supplements and comments on those referenced sections with specific reference to the communication of alarms.

830 These message segments are not appropriate to PCD-06 and PCD-07 communication between the ACM AM and ACM AC as that uses the WCTP protocol. It could be pertinent if the PCD-06 message includes support for WCM which would include the evidentiary data which is based upon HL7.

3.Z.1 MSH Message Header Segment

3.Z.1.1 MSH-21 Message Profile Identifier (EI) 01598

835 This field contains a message profile identification consistent with IHE PCD TF direction so as to uniquely identify IHE PCD ACM PCD-xx messages from IHE PCD DEC PCD-xx messages, and from messages associated with other IHE PCD profiles.

Table 3.Z.1-1: Message Profile Identifiers

Transactions	MSH-21.1 Entity Identifier	MSH-21.2 Namespace ID	MSH-21.3 Universal ID (the OID)	MSH-21.4 Universal ID Type
Report Alarm [PCD-04]	IHE_PCD_ACM_001	IHE PCD	1.3.6.1.4.1.19376.1.6.4.4	ISO
Report Alarm Status [PCD-05]	IHE_PCD_ACM_002	IHE PCD	1.3.6.1.4.1.19376.1.6.4.5	ISO
Disseminate Alarm [PCD-06]	IHE_PCD_ACM_003	IHE PCD	1.3.6.1.4.1.19376.1.6.4.6	ISO
Report Alarm Dissemination Status [PCD-07]	IHE_PCD_ACM_004	IHE PCD	1.3.6.1.4.1.19376.1.6.4.7	ISO

840 The sections below identify the data items used to identify the patient and/or the patient's location to the AM actor and which may be included in displays on the endpoint device to allow the notification recipient to determine the patient to which the alarm applies.

3.Z.2 PID Patient Identification Segment

845

850

This segment is required to be present and is populated with data used to identify the patient associated with the alarm in the case where the identity is available from the Alarm Source system. If the patient identification is not available from the Alarm Source system, the alarm may be location source based per ACM use case A1 in which case the PV1 segment identifies the location associated with the alarm. Additional information may be present to more unambiguously identify the patient.

Table 3.Z.2-1: HL7 Attribute Table – PID – Patient Identification

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM#	ELEMENT NAME
3	250	CX	O	Y		00106	Patient Identifier List
5	250	XPN	O	Y		00108	Patient name
7	26	TSO	O			00110	Date/Time of Birth
8	1	IS	O			00111	Administrative Sex

3.Z.2.1 PID-3 Patient Identifier List (CX) 00106

855

This information may be used by the AM actor in the message sent to the AC actor to identify the patient associated with the alarm within site specific HIPAA and electronic patient healthcare information policies.

3.Z.2.2 PID-5 Patient Name (XPN) 00108

860

This information may be used by the AM actor in the message sent to the AC actor to identify the patient associated with the alarm within site specific HIPAA and electronic patient healthcare information policies. Refer to PID-31 Identity Unknown Indicator for the means to identify that while a PID segment is provided the identity of the patient is unknown.

3.Z.2.3 PID-7 Date/Time of Birth (TSO) 00110

This information may be used by the AM actor in the message sent to the AC actor to identify the patient associated with the alarm within site specific HIPAA and electronic patient healthcare information policies.

865 ### 3.Z.2.4 PID-8 Administrative Sex (IS) 00111

This information may be used by the AM actor in the message sent to the AC actor to identify the patient associated with the alarm within site specific HIPAA and electronic patient healthcare information policies.

3.Z.2.5 PID-31 Identity Unknown Indicator (ID) 01535

870 Definition: This field indicates whether or not the patient's/person's identity is known. Refer to HL7 Table 0136 - Yes/No Indicator for valid values.

> Y the patient's/person's identity is unknown

> N the patient's/person's identity is known

3.Z.3 PV1 Patient Visit Segment

875 This segment is used to identify a patient location associated with the alarm. Real Time Location Services (RTLS) or GPS equipment or personnel location information is not passed in this segment. It is passed from the AR to the AM via an OBX segment.

If the Patient Identification (PID) segment is present in the alarm data and it contains an identified patient as in ACM use case A2 resolve patient location from a more contemporary 880 information source than this segment.

Table 3.Z.3-1: HL7 Attribute Table – PV1 – Patient Visit

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM#	ELEMENT NAME
3	80	PL	O			00133	Assigned Patient Location

3.Z.3.1 PV1-3 Assigned Patient Location (PL) 00133

This field contains the location associated with the alarm. This may not be the current location 885 of the alarm related patient. It is typically a location established by an external system such as ADT, as in the patient assigned bed location as used in association with a patient station of a nurse call system.

3.Z.4 ORC Observation Control Segment

This segment is optionally used to convey order request information for alarms involving 890 notification of order request or order result.   In addition, this segment may allow the association of the completed observation results reported in OBX segments with a particular previous order request.

Table 3.Z.4-1: HL7 Attribute Table – ORC – Observation Control

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM#	ELEMENT NAME
2	22	EI	O			00216	Placer Order Number
12	250	XCN	O	Y		00226	Ordering Provider
14	250	XTN	O	Y/2		00228	Call Back Phone Number

895

ORC-2 Placer Order Number (EI) 00216

This field is the placer application's order number.

ORC-12 Ordering Provider (XCN) 00226

900 This field contains the identity of the person who is responsible for creating the request (i.e.,
ordering physician). ORC-12-ordering provider is the same as OBR-16-ordering provider. If the
ordering provider is not present in the ORC, it may be present in the associated OBR. This is
particularly important when results are transmitted in an ORU message. In this case, the ORC is
not required and the identifying filler order number may be present in the OBR segment.

ORC-14 Call Back Phone Number (XTN) 00228

905 This field contains the telephone number to call for clarification of a request or other information
regarding the order. ORC-14-call back phone number is the same as OBR-17-order callback
phone number. If the structure of the telephony dial string is not known then the call back
number should be in the Unformatted Telephone number (ST) component of the field.

3.Z.5 OBR Observation Request Segment

910 A Report Alarm [PCD-04] transaction contains at most one alarm indication.

The OBR segment is used to uniquely identify the alarm indication and the descendent alarm
status update indications.

Table 3.Z.5-1: HL7 Attribute Table – OBR – Observation Result

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM#	ELEMENT NAME
2	22	EI	O			00216	Placer Order Number
3	22	EI	R			00217	Filler Order Number
4	250	CE	R			00238	Universal Service Identifier
16	3220	XCN	O	Y		00226	Ordering Provider
17	250	XTN	O	Y/2		00250	Order Callback Phone Number
28	3220	XCN	O	Y		00260	Result Copies To

915

OBR-2 Placer Order Number (EI) 00216

This field identifies an individual order (e.g., OBR) and is the same as ORC-2.

OBR-3 Filler Order Number (EI) 00217

This field serves as the unique identifier for status updates to an alarm indication identified in
920 OBR-29 Parent. This value is assigned by the Alarm Source and is used by system actors to
associate updates to a particular alarm identified in OBR-29 Parent.

OBR-4 Universal Service Identifier (CE) 00238

925 This field contains the identifier code for the packaged message content type, such as ALARM, WAVEFORM, EVENT, PROCEDURE, TREND, etc.

OBR-17 Order Callback Phone Number (XTN) 00250

This field is the telephone number for reporting a status or a result using the standard format with extension and/or beeper number when applicable. This can be used to pass the nurse call system patient station telephony call back information to the caregiver. If the structure of the telephony 930 dial string is not known then the call back number should be in the Unformatted Telephone number (ST) component of the field.

OBR-28 Result Copies To (XCN) 00260

This field should not be used in Report Alarm [PCD-04] transactions to indicate PIN/Carrier or other recipients for alarm dissemination. Instead use the Participant Information (PRT) segment.

935 ### OBR-29 Parent (EIP) 00261

This field serves as the unique identifier for the alarm indication. It is assigned by the Alarm Source and is used by system actors to associate all messages from all actors that pertain to a particular alarm throughout the history of the alarm. So the same value of OBR-29 will be sent by the Alarm Source in the messages concerning the start, end, continuation of the alarm, and 940 will also be used in status messages from other actors concerning that alarm. It may consist of a unique identifier of the device such as an EUI-64 and a serial number or time stamp for the alarm, but other forms that are unique among alarms sourced by a particular Alarm Reporter are acceptable. An order number sourced by the filling application may be used in the case of an order (Pharmacy or Laboratory) and in this case must also serve to uniquely identify the related 945 alarm events. For identification of status updates to an alarm indication see OBR-3 Filler order Number.

3.Z.6 PRT Participation Information Segment

The optional HL7 2.7 Participation Information Segment (PRT) is used to identify requested additional or the actual recipients of alarm disseminations and the status of those disseminations 950 for the Report Alarm [PCD-04] and Report Alarm Status [PCD-05] transactions.

One instance of the PRT segment occurs for each specified dissemination destination or dissemination status update.

The Participation Information segment contains the data necessary to add, update, correct, and delete from the record persons, organizations, or locations (participants) participating in the 955 activity being transmitted.

In general, the PRT segment is used to describe a participant playing a particular role within the context of the message. In this profile the role being played is that of an alarm dissemination requested or actual recipient.

The hierarchical positional location of the PRT segment within the HL7 message indicates the
960   relationship. When the segment is used following the OBR segment, then the participations
relate to the relevant participations in the observation.

Table 3.Z.6-1: HL7 Attribute Table - PRT – Participation Information

SEQ	LEN	DT	OPT	RP/#	TBL #	ITEM #	ELEMENT NAME
1	1..4	EI	C	N		02379	Participation Instance ID
2	2..2	ID	R		0287	00816	Action Code
3		CWE	O			02380	Action Reason
4		CWE	R		0912	02381	Participation
5		XCN	C	Y		02382	Participation Person
6		CWE	C			02383	Participation Person Provider Type
7		CWE	C		0406	02384	Participant Organization Unit Type
8		XON	C	Y		02385	Participation Organization
9		PL	C	Y		02386	Participant Location
10		EI	C	Y		02348	Participation Device
11		DTM	O			02387	Participation Begin Date/Time (arrival time)
12		DTM	O			02388	Participation End Date/Time (departure time)
13		CWE	O			02389	Participation Qualitative Duration
14		XAD	C	Y		02390	Participation Address
15		XTN	O	Y		02391	Participant Telecommunication Address

3.Z.6.1 PRT-1   Participation Instance ID   (EI)   02379

965
```
Components:<Entity Identifier (ST)> ^ <Namespace ID (IS)> ^ <Universal ID (ST)> ^
           <Universal ID Type (ID)>
```

Definition: This field contains a unique identifier of the specific participation record.

In the case of waypoints tracked for a shipment, it identifies the waypoint.

Condition: The identifier is required for traceability

970   For the Report Alarm Status [PCD-05] transaction this is the unique ID of the disseminated message and all
status updates on the dissemination should use the same ID value.

3.Z.6.2 PRT-2   Action code   (ID)   00816

Definition: This field reveals the intent of the message. Refer to *HL7 Table 0287 – Problem/goal action
code* for valid values.

975   For the Report Alarm [PCD-04] transaction the PRT-2 Action code is always AD indicating Add.

For the Report Alarm Status [PCD-05] transaction the PRT-2 Action Code is AD indicating Add for the first
status update and UP indicating Update for all others.

3.Z.6.3 PRT-3   Action Reason   (CWE)   02380

980

985

```
Components:<Identifier (ST)> ^ <Text (ST)> ^ <Name of Coding System (ID)> ^ <Alternate
          Identifier (ST)> ^ <Alternate Text (ST)> ^ <Name of Alternate Coding
          System (ID)> ^ <Coding System Version ID (ST)> ^ <Alternate Coding System
          Version ID (ST)> ^ <Original Text (ST)> ^ <Second Alternate Identifier
          (ST)> ^ <Second Alternate Text (ST)> ^ <Name of Second Alternate Coding
          System (ID)> ^ <Second Alternate Coding System Version ID (ST)> ^ <Coding
          System OID (ST)> ^ <Value Set OID (ST)> ^ <Value Set Version ID (DTM)> ^
          <Alternate Coding System OID (ST)> ^ <Alternate Value Set OID (ST)> ^
          <Alternate Value Set Version ID (DTM)> ^ <Second Alternate Coding System
          OID (ST)> ^ <Second Alternate Value Set OID (ST)> ^ <Second Alternate
          Value Set Version ID (DTM)>
```

990   Definition: This field indicates the reason why the person, organization, location, or device is assuming (or changing) the role (e.g., shift change, new primary nurse, etc.).

For the Report Alarm [PCD-04] transaction the PRT-3 Action Reason, Text, is not populated.

For the Report Alarm Status [PCD-05] transaction the PRT-3 Action Reason, Text, is the Report Dissemination Alarm Status [PCD-07] status text value, and the Coding System is IHE_PCD_ACM.

995   Alarm Communicator (AC) status values correlated from the Report Dissemination Alarm Status [PCD-07] status values to be returned to the Alarm Manager (AM) resulting from Disseminate Alarm [PCD-06] from Alarm Manager (AM) to Alarm Communicator (AC) and transcribed into PRT-3-2 Text.

1000   **Table 3.Z.6.3-1: Communication Status Enumeration from Report Dissemination Alarm Status [PCD-07]**

Req.	Value for PRT-3-2	Description
R	Received	Received by Alarm Communicator (AC)
R	Undeliverable	Undeliverable to endpoint
R	Delivered	Delivered to endpoint
R	Read	Read at endpoint
R	Accepted	Accepted by endpoint
O	AcceptedPositive	Accepted by endpoint as true positive
O	AcceptedNotRelevant	Accepted by endpoint as true positive however not clinically relevant
O	AcceptedFalse	Accepted by endpoint as false positive
R	Rejected	Rejected by endpoint
O	Cancelled	Cancelled by endpoint (does not cancel at alarm source)
O	CancelledOther	Cancelled by other than endpoint (does not cancel alarm at source)
O	CallbackStart	Callback start at endpoint (start of telephony call to alarm indicated destination)
O	CallbackEnd	Callback end at endpoint (end of telephony call to alarm indicated destination)

43

3.Z.6.4 PRT-4 Participation (CWE) 02381

```
Components:<Identifier (ST)> ^ <Text (ST)> ^ <Name of Coding System (ID)> ^ <Alternate
          Identifier (ST)> ^ <Alternate Text (ST)> ^ <Name of Alternate Coding
          System (ID)> ^ <Coding System Version ID (ST)> ^ <Alternate Coding System
          Version ID (ST)> ^ <Original Text (ST)> ^ <Second Alternate Identifier
          (ST)> ^ <Second Alternate Text (ST)> ^ <Name of Second Alternate Coding
          System (ID)> ^ <Second Alternate Coding System Version ID (ST)> ^ <Coding
          System OID (ST)> ^ <Value Set OID (ST)> ^ <Value Set Version ID (DTM)> ^
          <Alternate Coding System OID (ST)> ^ <Alternate Value Set OID (ST)> ^
          <Alternate Value Set Version ID (DTM)> ^ <Second Alternate Coding System
          OID (ST)> ^ <Second Alternate Value Set OID (ST)> ^ <Second Alternate
          Value Set Version ID (DTM)>
```

1005

1010

1015 Definition: This field indicates the functional involvement with the activity being transmitted (e.g., Case Manager, Evaluator, Transcriber, Nurse Care Practitioner, Midwife, Physician Assistant, etc.). Refer to *HL7 Table 0912 – Participation* for valid values.

For the Report Alarm [PCD-04] transaction the presence of one or more PRT segments containing PRT-4 Participation Identifier, Text is RCT (indicating Result Copies To) indicates AR direct indication of
1020 additional recipients.

For the Report Alarm [PCD-04] transaction the PRT-4 Participation Identifier, Text is RO (indicating Responsible Observer).

For the Report Alarm Status [PCD-05] transaction the PRT-4 Participation Identifier, Text is RO (indicating Responsible Observer), and Alternative Identifier is AAP for Alert Acknowledging Provider.

1025 **Table 3.Z.6.4-1: HL7 Table 0912 - Participation**

Value	Description	Used with
AD	Admitting Provider	PV1-17 Admitting doctor
AI	Assistant/Alternate Interpreter	
AAP	Alert Acknowledging Provider	PCD ACM Report Alarm Status [PCD-05]
AP	Administering Provider	RXA-10 Administering Provider
ARI	Assistant Result Interpreter	
AT	Attending Provider	PV1-7 Attending doctor
AUT	AUT Author/Event Initiator	ORC-19 Action By
CP	Consulting Provider	
DP	Dispensing Provider	RXD-10 Dispensing Provider
EP	Entering Provider (probably not the same as transcriptionist?)	ORC-10 Entered By
EQUIP	Equipment	
FHCP	Family Health Care Professional	
MDIR	Medical Director	OBX-25 Performing Organization Medical Director
OP	Ordering Provider	ORC-12 Ordering Provider, OBR-16 Ordering Provider, RXO-14 Ordering Provider's DEA Number, RXE-13 Ordering Provider's DEA Number, ORC-24 Ordering Provider Address
PB	Packed by	

44

Value	Description	Used with
PH	Pharmacist (not sure how to dissect Pharmacist/Treatment Supplier's Verifier ID)	RXE-14 Pharmacist/Treatment Supplier's Verifier ID
PI	Primary Interpreter	
PO	Performing Organization	
POMD	Performing Organization Medical Director	
PP	Primary Care Provider	
PRI	Principal Result Interpreter	
RCT	Results Copies To	
RO	Responsible Observer	OBX-16 Responsible Observer
RP	Referring Provider	PV1-8 Referring doctor
RT	Referred to Provider	
SB	Send by	
SC	Specimen Collector	OBR-10 Collector Identifier
TN	Technician	
TR	Transcriptionist	
VP	Verifying Provider	ORC-11 Verified By
VPS	Verifying Pharmaceutical Supplier (not sure how to dissect Pharmacist/Treatment Supplier's Verifier ID)	RXE-14 Pharmacist/Treatment Supplier's Verifier ID
VTS	Verifying Treatment Supplier (not sure how to dissect Pharmacist/Treatment Supplier's Verifier ID)	RXE-14 Pharmacist/Treatment Supplier's Verifier ID
WAY	Waypoint	
WAYR	Waypoint Recipient	

3.Z.6.5 PRT-5 Participation Person (XCN) 02382

Components:<Person Identifier (ST)> ^ <Family Name (FN)> ^ <Given Name (ST)> ^ <Second and Further Given Names or Initials Thereof (ST)> ^ <Suffix (e.g., JR or III) (ST)> ^ <Prefix (e.g., DR) (ST)> ^ <WITHDRAWN Constituent> ^ <DEPRECATED-Source Table (CWE)> ^ <Assigning Authority (HD)> ^ <Name Type Code (ID)> ^ <Identifier Check Digit (ST)> ^ <Check Digit Scheme (ID)> ^ <Identifier Type Code (ID)> ^ <Assigning Facility (HD)> ^ <Name Representation Code (ID)> ^ <Name Context (CWE)> ^ <WITHDRAWN Constituent> ^ <Name Assembly Order (ID)> ^ <Effective Date (DTM)> ^ <Expiration Date (DTM)> ^ <Professional Suffix (ST)> ^ <Assigning Jurisdiction (CWE)> ^ <Assigning Agency or Department (CWE)> ^ <Security Check (ST)> ^ <Security Check Scheme (ID)>

1030

1035

1040   Subcomponents for Family Name (FN): <Surname (ST)> & <Own Surname Prefix (ST)> & <Own Surname (ST)> & <Surname Prefix from Partner/Spouse (ST)> & <Surname from Partner/Spouse (ST)>

1045   Subcomponents for Source Table (CWE): <Identifier (ST)> & <Text (ST)> & <Name of Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)> & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)> & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> & <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name of Second Alternate Coding System (ID)> & <Second Alternate Coding System

1050   Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> & <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> & <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> & <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

1055   Subcomponents for Assigning Authority (HD): <Namespace ID (CWE)> & <Universal ID (ST)> & <Universal ID Type (ID)>

Subcomponents for Namespace ID (CWE): <Identifier (ST)> & <Text (ST)> & <Name of Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)> & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)> & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> &

1060   <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name of Second Alternate Coding System (ID)> & <Second Alternate Coding System Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> & <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> & <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> &

1065   <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

Subcomponents for Assigning Facility (HD): <Namespace ID (CWE)> & <Universal ID (ST)> & <Universal ID Type (ID)>

Subcomponents for Namespace ID (CWE): <Identifier (ST)> & <Text (ST)> & <Name of Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)>

1070   & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)> & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> & <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name of Second Alternate Coding System (ID)> & <Second Alternate Coding System

1075   Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> & <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> & <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> & <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

1080   Subcomponents for Name Context (CWE): <Identifier (ST)> & <Text (ST)> & <Name of Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)> & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)> & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> & <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name

1085   of Second Alternate Coding System (ID)> & <Second Alternate Coding System Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> & <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> & <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> & <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set

1090   OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

```
              Subcomponents for Assigning Jurisdiction (CWE): <Identifier (ST)> & <Text (ST)> &
                      <Name of Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate
                      Text (ST)> & <Name of Alternate Coding System (ID)> & <Coding System
                      Version ID (ST)> & <Alternate Coding System Version ID (ST)> & <Original
1095                  Text (ST)> & <Second Alternate Identifier (ST)> & <Second Alternate Text
                      (ST)> & <Name of Second Alternate Coding System (ID)> & <Second Alternate
                      Coding System Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID
                      (ST)> & <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)>
                      & <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)>
1100                  & <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
                      OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

              Subcomponents for Assigning Agency or Department (CWE): <Identifier (ST)> & <Text
                      (ST)> & <Name of Coding System (ID)> & <Alternate Identifier (ST)> &
                      <Alternate Text (ST)> & <Name of Alternate Coding System (ID)> & <Coding
1105                  System Version ID (ST)> & <Alternate Coding System Version ID (ST)> &
                      <Original Text (ST)> & <Second Alternate Identifier (ST)> & <Second
                      Alternate Text (ST)> & <Name of Second Alternate Coding System (ID)> &
                      <Second Alternate Coding System Version ID (ST)> & <Coding System OID
                      (ST)> & <Value Set OID (ST)> & <Value Set Version ID (DTM)> & <Alternate
1110                  Coding System OID (ST)> & <Alternate Value Set OID (ST)> & <Alternate
                      Value Set Version ID (DTM)> & <Second Alternate Coding System OID (ST)> &
                      <Second Alternate Value Set OID (ST)> & <Second Alternate Value Set
                      Version ID (DTM)>
```

Definition: This field contains the identity of the person who is represented in the participation that is being transmitted.

If this attribute repeats, all instances must represent the same person.

Condition: At least one of the Participation Person, Participation Organization, Participation Location, or Participation Device fields must be valued.

For the Report Alarm [PCD-04] transaction the PRT-5 participation Person is the identification of an addition recipient of the dissemination of the alarm. The PRT-15 Participation Telecommunication Address may also be used if only a PIN/Carrier destination is known.

For the Report Alarm Status [PCD-05] transaction the PRT-5 Participation Person is the identification of the person that was the participating recipient of the message.

3.Z.6.6 PRT-6 Participation Person Provider Type (CWE) 02383

```
              Components:<Identifier (ST)> ^ <Text (ST)> ^ <Name of Coding System (ID)> ^ <Alternate
                      Identifier (ST)> ^ <Alternate Text (ST)> ^ <Name of Alternate Coding
                      System (ID)> ^ <Coding System Version ID (ST)> ^ <Alternate Coding System
                      Version ID (ST)> ^ <Original Text (ST)> ^ <Second Alternate Identifier
                      (ST)> ^ <Second Alternate Text (ST)> ^ <Name of Second Alternate Coding
1130                  System (ID)> ^ <Second Alternate Coding System Version ID (ST)> ^ <Coding
                      System OID (ST)> ^ <Value Set OID (ST)> ^ <Value Set Version ID (DTM)> ^
                      <Alternate Coding System OID (ST)> ^ <Alternate Value Set OID (ST)> ^
                      <Alternate Value Set Version ID (DTM)> ^ <Second Alternate Coding System
                      OID (ST)> ^ <Second Alternate Value Set OID (ST)> ^ <Second Alternate
1135                  Value Set Version ID (DTM)>
```

Definition: This field contains a code identifying the provider type for the participating person. This attribute correlates to the following master file attribute: STF-4 Staff Type. Coded values from the correlated master file table are used; the user defined master file table is used as the coding system for this attribute. For example, if you are using values from STF-2 Staff Type, the coding system would be HL70182 which is the table number for the user defined Staff Type table. This field is included in this segment to support international requirements. When ROL is used in an encounter message, it is not intended as a master file update.

47

Condition: This field may only be valued if PRT-5 Participation Person is valued.

For the Report Alarm Status [PCD-05] transaction this field is not populated.

1145 3.Z.6.7 PRT-7 Participation Organization Unit Type (CWE) 02384

```
Components:<Identifier (ST)> ^ <Text (ST)> ^ <Name of Coding System (ID)> ^ <Alternate
          Identifier (ST)> ^ <Alternate Text (ST)> ^ <Name of Alternate Coding
          System (ID)> ^ <Coding System Version ID (ST)> ^ <Alternate Coding System
          Version ID (ST)> ^ <Original Text (ST)> ^ <Second Alternate Identifier
          (ST)> ^ <Second Alternate Text (ST)> ^ <Name of Second Alternate Coding
          System (ID)> ^ <Second Alternate Coding System Version ID (ST)> ^ <Coding
          System OID (ST)> ^ <Value Set OID (ST)> ^ <Value Set Version ID (DTM)> ^
          <Alternate Coding System OID (ST)> ^ <Alternate Value Set OID (ST)> ^
          <Alternate Value Set Version ID (DTM)> ^ <Second Alternate Coding System
          OID (ST)> ^ <Second Alternate Value Set OID (ST)> ^ <Second Alternate
          Value Set Version ID (DTM)>
```

Definition: This field identifies the environment in which the participant acts in the role specified in PRT-3 Action Reason. In the case of a person, the environment is not the specialty for the provider. The specialty information for the provider is defined in the PRA segment.

This attribute is included in the PRT segment to allow communication of this data when the participant information may not have been communicated previously in a master file or to provide better context. Refer to *User-defined table 0406 - Organization unit type*. This field is included in this segment to support international requirements, and is not intended as a master file update.

Condition: This field may only be valued if PRT-5 Participation Person is valued.

For the Report Alarm Status [PCD-05] transaction this field is not populated.

3.Z.6.8 PRT-8 Participation Organization (XON) 02385

```
Components:<Organization Name (ST)> ^ <Organization Name Type Code (CWE)> ^ <WITHDRAWN
          Constituent> ^ <Identifier Check Digit (NM)> ^ <Check Digit Scheme  (ID)>
          ^ <Assigning Authority (HD)> ^ <Identifier Type Code (ID)> ^ <Assigning
          Facility (HD)> ^ <Name Representation Code (ID)> ^ <Organization
          Identifier (ST)>

Subcomponents for Organization Name Type Code (CWE): <Identifier (ST)> & <Text (ST)>
          & <Name of Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate
          Text (ST)> & <Name of Alternate Coding System (ID)> & <Coding System
          Version ID (ST)> & <Alternate Coding System Version ID (ST)> & <Original
          Text (ST)> & <Second Alternate Identifier (ST)> & <Second Alternate Text
          (ST)> & <Name of Second Alternate Coding System (ID)> & <Second Alternate
          Coding System Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID
          (ST)> & <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)>
          & <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)>
          & <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
          OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

Subcomponents for Assigning Authority (HD): <Namespace ID (CWE)> & <Universal ID
          (ST)> & <Universal ID Type (ID)>
```

48

1185
```
Subcomponents for Namespace ID (CWE):  <Identifier (ST)> & <Text (ST)> & <Name of
        Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)>
        & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)>
        & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> &
        <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name
```
1190
```
        of Second Alternate Coding System (ID)> & <Second Alternate Coding System
        Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> &
        <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> &
        <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> &
        <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
```
1195
```
        OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

Subcomponents for Assigning Facility (HD):  <Namespace ID (CWE)> & <Universal ID (ST)>
        & <Universal ID Type (ID)>

Subcomponents for Namespace ID (CWE):  <Identifier (ST)> & <Text (ST)> & <Name of
        Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)>
```
1200
```
        & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)>
        & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> &
        <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name
        of Second Alternate Coding System (ID)> & <Second Alternate Coding System
        Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> &
```
1205
```
        <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> &
        <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> &
        <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
        OID (ST)> & <Second Alternate Value Set Version ID (DTM)>
```

Definition: The organization that is involved in the participation. If PRT-5 Participation Person is valued,
1210
it reflects the affiliation of the individual participating as identified in PRT-4 Participation. Otherwise the
organization is directly participating as identified in PRT-4 Participation.

If this attribute repeats, all instances must represent the same organization.

Condition: At least one of the Participation Person, Participation Organization, Participation Location, or
Participation Device fields must be valued.

1215   For the Report Alarm Status [PCD-05] transaction this field is not populated.

3.Z.6.9 PRT-9 Participation Location (PL) 02386

```
Components:<Point of Care (HD)> ^ <Room (HD)> ^ <Bed (HD)> ^ <Facility (HD)> ^
        <Location Status (IS)> ^ <Person Location Type (IS)> ^ <Building (HD)> ^
        <Floor (HD)> ^ <Location Description (ST)> ^ <Comprehensive Location
```
1220
```
        Identifier (EI)> ^ <Assigning Authority for Location (HD)>

Subcomponents for Point of Care (HD):  <Namespace ID (CWE)> & <Universal ID (ST)> &
        <Universal ID Type (ID)>

Subcomponents for Namespace ID (CWE):  <Identifier (ST)> & <Text (ST)> & <Name of
        Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)>
```
1225
```
        & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)>
        & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> &
        <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name
        of Second Alternate Coding System (ID)> & <Second Alternate Coding System
        Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> &
```
1230
```
        <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> &
        <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> &
        <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
        OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

Subcomponents for Room (HD):  <Namespace ID (CWE)> & <Universal ID (ST)> & <Universal
```
1235
```
        ID Type (ID)>
```

Subcomponents for Namespace ID (CWE): <Identifier (ST)> & <Text (ST)> & <Name of
Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)>
& <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)>
& <Alternate Coding System Version ID (ST)> & <Original Text (ST)> &
<Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name
of Second Alternate Coding System (ID)> & <Second Alternate Coding System
Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> &
<Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> &
<Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> &
<Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

Subcomponents for Bed (HD): <Namespace ID (CWE)> & <Universal ID (ST)> & <Universal
ID Type (ID)>

Subcomponents for Namespace ID (CWE): <Identifier (ST)> & <Text (ST)> & <Name of
Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)>
& <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)>
& <Alternate Coding System Version ID (ST)> & <Original Text (ST)> &
<Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name
of Second Alternate Coding System (ID)> & <Second Alternate Coding System
Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> &
<Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> &
<Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> &
<Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

Subcomponents for Facility (HD): <Namespace ID (CWE)> & <Universal ID (ST)> &
<Universal ID Type (ID)>

Subcomponents for Namespace ID (CWE): <Identifier (ST)> & <Text (ST)> & <Name of
Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)>
& <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)>
& <Alternate Coding System Version ID (ST)> & <Original Text (ST)> &
<Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name
of Second Alternate Coding System (ID)> & <Second Alternate Coding System
Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> &
<Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> &
<Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> &
<Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

Subcomponents for Building (HD): <Namespace ID (CWE)> & <Universal ID (ST)> &
<Universal ID Type (ID)>

Subcomponents for Namespace ID (CWE): <Identifier (ST)> & <Text (ST)> & <Name of
Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)>
& <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)>
& <Alternate Coding System Version ID (ST)> & <Original Text (ST)> &
<Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name
of Second Alternate Coding System (ID)> & <Second Alternate Coding System
Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> &
<Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> &
<Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> &
<Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

Subcomponents for Floor (HD): <Namespace ID (CWE)> & <Universal ID (ST)> & <Universal
ID Type (ID)>

1290

```
Subcomponents for Namespace ID (CWE):  <Identifier (ST)> & <Text (ST)> & <Name of
        Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)>
        & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)>
        & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> &
        <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name
        of Second Alternate Coding System (ID)> & <Second Alternate Coding System
        Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> &
        <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> &
        <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> &
        <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
        OID (ST)> & <Second Alternate Value Set Version ID (DTM)>
```

1295

```
Subcomponents for Comprehensive Location Identifier (EI):  <Entity Identifier (ST)> &
        <Namespace ID (IS)> & <Universal ID (ST)> & <Universal ID Type (ID)>
```

1300

```
Subcomponents for Assigning Authority for Location (HD):  <Namespace ID (CWE)> &
        <Universal ID (ST)> & <Universal ID Type (ID)>
```

```
Subcomponents for Namespace ID (CWE):  <Identifier (ST)> & <Text (ST)> & <Name of
        Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)>
        & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)>
        & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> &
        <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name
        of Second Alternate Coding System (ID)> & <Second Alternate Coding System
        Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> &
        <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> &
        <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> &
        <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
        OID (ST)> & <Second Alternate Value Set Version ID (DTM)>
```

1305

1310

1315 Definition: This field specifies the physical location (e.g., nurse station, ancillary service location, clinic, or floor) that is participating. If either PRT-5 Participation Person or PRT-8 Participation Organization is valued, it reflects the location of the individual or organization participating as identified in PRT-4 Participation. Otherwise the location is directly participating as identified in PRT-4 Participation.

If this attribute repeats, all instances must represent the same organization.

1320 Condition: At least one of the Participation Person, Participation Organization, Participation Location, or Participation Device fields must be valued.

For the Report Alarm Status [PCD-05] transaction this field is optional.

3.Z.6.10 PRT-10   Participation Device   (EI)   02348

```
Components:<Entity Identifier (ST)> ^ <Namespace ID (IS)> ^ <Universal ID (ST)> ^
        <Universal ID Type (ID)>
```

1325 Definition: Identifier for the device participating.

Example: The device used to register the shipment at the waypoint.

If this attribute repeats, all instances must represent the same device.

Condition: At least one of the Participation Person, Participation Organization, Participation Location, or Participation Device fields must be valued.

1330 For the Report Alarm Status [PCD-05] transaction the Entity Identifier is the PIN/Carrier or device communication ID and namespace ID is the Alarm Communicator (AC) or Alarm Manager (AM) ID.

3.Z.6.11 PRT-11   Participation Begin Date/Time   (DTM)   02387

Definition: This field contains the date/time when the participation began.

In the case of waypoints, this reflects the time a shipment arrives at the waypoint.

1335   For the Report Alarm Status [PCD-05] transaction this field contains the time of the dissemination status or response update.

3.Z.6.12 PRT-12   Participation End Date/Time   (DTM)   02388

Definition: This field contains the date/time when the participation ended.

In the case of waypoints, this reflects the time a shipment departs from the waypoint.

1340   For the Report Alarm Status [PCD-05] transaction this field is not populated.

3.Z.6.13 PRT-13   Participation Qualitative Duration   (CWE)   02389

```
Components:<Identifier (ST)> ^ <Text (ST)> ^ <Name of Coding System (ID)> ^ <Alternate
           Identifier (ST)> ^ <Alternate Text (ST)> ^ <Name of Alternate Coding
           System (ID)> ^ <Coding System Version ID (ST)> ^ <Alternate Coding System
           Version ID (ST)> ^ <Original Text (ST)> ^ <Second Alternate Identifier
           (ST)> ^ <Second Alternate Text (ST)> ^ <Name of Second Alternate Coding
           System (ID)> ^ <Second Alternate Coding System Version ID (ST)> ^ <Coding
           System OID (ST)> ^ <Value Set OID (ST)> ^ <Value Set Version ID (DTM)> ^
           <Alternate Coding System OID (ST)> ^ <Alternate Value Set OID (ST)> ^
           <Alternate Value Set Version ID (DTM)> ^ <Second Alternate Coding System
           OID (ST)> ^ <Second Alternate Value Set OID (ST)> ^ <Second Alternate
           Value Set Version ID (DTM)>
```

Definition: This field contains the qualitative length of time for participation (e.g., until the next assessment, four days, until discharge, etc.).

1355   For the Report Alarm Status [PCD-05] transaction this field is not populated.

3.Z.6.14 PRT-14   Participation Address   (XAD)   02390

```
Components:<Street Address (SAD)> ^ <Other Designation (ST)> ^ <City (ST)> ^ <State or
           Province (ST)> ^ <Zip or Postal Code (ST)> ^ <Country (ID)> ^ <Address
           Type (ID)> ^ <Other Geographic Designation (ST)> ^ <County/Parish Code
           (CWE)> ^ <Census Tract (CWE)> ^ <Address Representation Code (ID)> ^
           <WITHDRAWN Constituent> ^ <Effective Date (DTM)> ^ <Expiration Date (DTM)>
           ^ <Expiration Reason (CWE)> ^ <Temporary Indicator (ID)> ^ <Bad Address
           Indicator (ID)> ^ <Address Usage (ID)> ^ <Addressee (ST)> ^ <Comment (ST)>
           ^ <Preference Order (NM)> ^ <Protection Code (CWE)> ^ <Address Identifier
           (EI)>

Subcomponents for Street Address (SAD):  <Street or Mailing Address (ST)> & <Street
           Name (ST)> & <Dwelling Number (ST)>
```

Subcomponents for County/Parish Code (CWE): <Identifier (ST)> & <Text (ST)> & <Name of Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)> & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)> & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> & <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name of Second Alternate Coding System (ID)> & <Second Alternate Coding System Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> & <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> & <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> & <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

Subcomponents for Census Tract (CWE): <Identifier (ST)> & <Text (ST)> & <Name of Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)> & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)> & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> & <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name of Second Alternate Coding System (ID)> & <Second Alternate Coding System Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> & <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> & <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> & <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

Subcomponents for Expiration Reason (CWE): <Identifier (ST)> & <Text (ST)> & <Name of Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)> & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)> & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> & <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name of Second Alternate Coding System (ID)> & <Second Alternate Coding System Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> & <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> & <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> & <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

Subcomponents for Protection Code (CWE): <Identifier (ST)> & <Text (ST)> & <Name of Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)> & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)> & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> & <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name of Second Alternate Coding System (ID)> & <Second Alternate Coding System Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> & <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> & <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> & <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set OID (ST)> & <Second Alternate Value Set Version ID (DTM)>

Subcomponents for Address Identifier (EI): <Entity Identifier (ST)> & <Namespace ID (IS)> & <Universal ID (ST)> & <Universal ID Type (ID)>

Definition: This field contains addresses associated with the participation. The address can repeat to indicate alternate addresses or an alternate expression of the same address.

Condition: The address must be present if the Participation is Performing Organization Medical Director.

For the Report Alarm Status [PCD-05] transaction this field is not populated.

53

3.Z.6.15 PRT-15   Participation Telecommunication Address   (XTN)   02391

```
Components:<WITHDRAWN Constituent> ^ <Telecommunication Use Code (ID)> ^
          <Telecommunication Equipment Type (ID)> ^ <Communication Address (ST)> ^
          <Country Code (SNM)> ^ <Area/City Code (SNM)> ^ <Local Number (SNM)> ^
          <Extension (SNM)> ^ <Any Text (ST)> ^ <Extension Prefix (ST)> ^ <Speed
          Dial Code (ST)> ^ <Unformatted Telephone number  (ST)> ^ <Effective Start
          Date (DTM)> ^ <Expiration Date (DTM)> ^ <Expiration Reason (CWE)> ^
          <Protection Code (CWE)> ^ <Shared Telecommunication Identifier (EI)> ^
          <Preference Order (NM)>
```

1425

```
Subcomponents for Expiration Reason (CWE): <Identifier (ST)> & <Text (ST)> & <Name of
          Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)>
          & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)>
          & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> &
          <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name
          of Second Alternate Coding System (ID)> & <Second Alternate Coding System
          Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> &
          <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> &
          <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> &
          <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
          OID (ST)> & <Second Alternate Value Set Version ID (DTM)>
```

1430

1435

```
Subcomponents for Protection Code (CWE): <Identifier (ST)> & <Text (ST)> & <Name of
          Coding System (ID)> & <Alternate Identifier (ST)> & <Alternate Text (ST)>
          & <Name of Alternate Coding System (ID)> & <Coding System Version ID (ST)>
          & <Alternate Coding System Version ID (ST)> & <Original Text (ST)> &
          <Second Alternate Identifier (ST)> & <Second Alternate Text (ST)> & <Name
          of Second Alternate Coding System (ID)> & <Second Alternate Coding System
          Version ID (ST)> & <Coding System OID (ST)> & <Value Set OID (ST)> &
          <Value Set Version ID (DTM)> & <Alternate Coding System OID (ST)> &
          <Alternate Value Set OID (ST)> & <Alternate Value Set Version ID (DTM)> &
          <Second Alternate Coding System OID (ST)> & <Second Alternate Value Set
          OID (ST)> & <Second Alternate Value Set Version ID (DTM)>
```

1440

1445

```
Subcomponents for Shared Telecommunication Identifier (EI): <Entity Identifier (ST)>
          & <Namespace ID (IS)> & <Universal ID (ST)> & <Universal ID Type (ID)>
```

1450

Definition: The waypoint telecommunication address field carries telecommunications addresses for the waypoint. These telecommunications addresses are used to contact the waypoint for additional information regarding the receipt of the shipment. The address can repeat to indicate alternate addresses or an alternate expression of the same address.

1455 For the Report Alarm [PCD-04] transaction this field may also be used if only a PIN/Carrier destination is known, in which case the PIN is in the first sub-component of the Communication Address component and the Carrier is in the second sub-component of the Communication Address component.

For the Report Alarm Status [PCD-05] transaction, if the PIN/Carrier of the recipient is known 1460 then this would contain that information just as it is passed in Report Alarm [PCD-04] so that the Alarm Reporter could use this information to contact the recipient.

3.Z.7 OBX Observation Result Segment

A Report Alarm [PCD-04] transaction contains at most one alarm indications. The alarm indication consists of multiple heterogeneous key attributes such as alarm source, alarm priority,

1465 and alarm phase which are called facets in this discussion, and which are encoded in multiple
OBX segments hierarchically nested under one or more OBR segment (all OBX segments under
the OBR must pertain to a single alarm). The different OBX segments pertaining to an alarm
indication are distinguished by OBX-4 Observation Sub-ID, which uses a dotted notation to
identify the specific source within an instrument, and for alarms, the facet represented by a
1470 particular OBX segment. This dotted notation is based on the DEC profile, which in turn is based
on a suggestion in the HL7 version 2.6 specification (see section 7.4.2.4 "Observation Sub-ID").

Most alarm message characteristics are identified by combination of OBX-3 Observation
Identifier and OBX-4 Observation Sub-ID and contain a value in OBX-5 Observation Value.
Alarm Priority and Alarm Source are given in the OBX-8 Abnormal Flags field of the facet 1
1475 OBX segment. They should not be repeated on subsequent OBX segments for other facets on the
principle that data items should have one best placement and unneeded repetition invites
inconsistency.

Since the information to be conveyed in this profile has much in common with clinical
measurements already covered by the existing profile, only extensions and other necessary
1480 differences will be described here. For all other details, the IHE PCD technical Framework is to
be followed.

3.Z.7.1 Semantics

The intention is to transmit transparently the key attributes of an event relevant to caregivers.
These include:

1485 • The identity of the alarm

• Whether its source is physiological or technical

• Its priority (severity)

• The state transition or persistent state that is being communicated by the current message

The representation relies on ISO/IEEE 11073 nomenclature and concepts for alarms, which in
1490 turn are consistent with IEC 60601-1-8 alarm nomenclature and concepts.

Table 3.Z.7.1-1: HL7 Attribute Table – OBX – Observation Result

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM#	ELEMENT NAME
2	2	ID	C		0125	00570	Value Type
3	250	CE	R			00571	Observation Identifier
4	20	ST	C			00572	Observation Sub-ID
5	99999	varies	C	Y/2		00573	Observation Value
6	250	CE	O			00574	Units
7	60	ST	O			00575	References Range
8	5	IS	O	Y	0078	00576	Abnormal Flags
14	26	TS	CE				Observation Date/Time

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM#	ELEMENT NAME
18	22	EI	O	Y		01479	Equipment Instance Identifier

3.Z.7.2 OBX-2 Value Type (ID) 00570

This field contains the format of the observation value in the OBX. For an alarm indication this is CWE. This is to permit OBX-5.9 Original Text to optionally contain the human readily recognizable description of the alarm indication so as to avoid displaying MDC or other encodings to notification dissemination recipients, often clinicians, assistants, or clinical engineers.

3.Z.7.3 OBX-3 Observation Identifier (CE) 00571

This field contains a unique identifier for the kind of measurement or device-dependent data that is given in OBX-5 Observation Value of the current segment. It shall preferably be drawn from the MDC nomenclature, or, failing that, LOINC. Terms not in the MDC nomenclature should be submitted to ISO/IEEE 11073 committee for possible standardization. Pending standardization, on a temporary basis by site agreement, agreed-on numeric codes and identifier strings in the range reserved in the standard for private codes may be used if necessary.

3.Z.7.4 OBX-4 Observation Sub-ID (ST) 00572

This field is used to distinguish between multiple OBX segments with the same observation ID organized under one OBR. The sub-identifier is also used to group related components. The scheme used for alarms is an extension of that used in the DEC profile transactions for measurements, which should be studied by those planning to use the Alarm Communication Management supplement. It uses a dotted notation, where the elements are numbers distinguishing the hierarchical containment levels of different measurements and different technical subsystems within the ISO/IEE 11073 Domain Information Model of the patient care device, that is, <MDS>.<VMD>.<CHANNEL>.<METRIC >.

In the Alarm Communications Management profile, a fifth element, <FACET>, is added to distinguish the additional facets of an alarm, such as Alarm State, Phase, Inactivation State, and Evidentiary Data, that must be conveyed in associated additional OBX segments beyond the first.

Table 3.Z.7.4-1: Observation Sub-ID Facets

<FACET> value	Facet name	Comments
1	Event identification	This facet specifies the MDC event code for the alarm
2	Source identification	Identifies the physiological measurement or technical source responsible for the alarm.
3	Event phase	Whether the stimulus for the message is the beginning, end, or some other state or state transition of the alarm.

<FACET> value	Facet name	Comments
4	Alarm state	Indicates the state of the underlying alarm condition at the patient care device: inactive | active | latched (no longer active but persisted to allow caregivers to be notified of transient but significant events)
5	Inactivation State	Optional. Indicates whether visual or aural indications at the patient care device are inactivated.
6	Real-time location	Optional. Real time location data concerning the patient, if available. Applicable where there are technical means to determine the current location of the patient, as distinct from the administratively assigned location that may be present in segment PV1. The Observation Value for this facet is based upon a combination of digital and site agreed named references with the digital information based upon the World Geodetic System (WGS) either 1984 or 2004. Additionally each digital data component should optionally include a metric distance based margin for error.
7	Evidentiary data	Optional. Real time waveform evidentiary data or graphical snippet.

3.Z.7.5 OBX-5 Observation Value (varies) 00573

This field contains the value observed by the alarm reporter. Its meaning differs according to the facet identified in OBX-4 Sub-ID (see above). The following sections give the details for each facet.

In all cases, OBX-2-value type contains the data type for this field according to which observation value is formatted. It is not a required field because some systems will report only the abnormal flags for the observation (OBX-8). The length of the observation field is variable, depending upon OBX-3-value type. This field may repeat for multipart, single answer results with appropriate data types, e.g., CE, TX, and FT data types.

Facet 1. Event Identification

The identity of alarms is represented by event codes from ISO/IEEE 11073-10101 nomenclature for alerts (Block E).

Figure 3.Z.7.5-1: Event Identification Facet

1545 **Facet 2. Source identification**

For an event code corresponding with a metric alarm, this segment identifies the particular measurement that is the source of the alarm by its MDC nomenclature code in OBX-3 Observation Identifier. If it has a numeric value, it shall be in OBX-5 Observation Value, and if available the alarm range set in the device will be encoded in OBX-7 Reference Rang

1550 For a technical alarm, this facet specifies the subsystem that is the source of the event by its MDC object code in OBX-5 Observation Value, and by its dotted sub-ID notation according to the DEC specification for OBX-4 Observation Sub-ID.

Facet 3. Event Phase

Each occurrence contains one of the following phase indications of the alarm from the
1555 EventCurrentPhase enumeration:

- tpoint
- start
- continue
- end
1560 - update
- escalate
- de-escalate
- reset

1565

Figure 3.Z.7.5-2: Event Phase

The EventCurrentPhase identifies the state transition or state that the current alarm message is indicating: a *tpoint* event is a time point event with no duration, a **continue** event indicates that
1570 this message does not represent a state transition but rather reports the continuation of an event that started at some previous time. An **update** indicates a change other than a state transition in a previously reported alarm, such as a further change in an out-of-limit metric. The phases *escalate* and *de-escalate* represent changes in alarm priority as assessed by the patient care device.

1575 **State transitions**

A message representing an alarm is sent aperiodically, when the alarm undergoes a state transition that may be significant for notification (alarm start, alarm end, escalation or de-escalation of priority as evaluated by the alarm source).

By site agreement, messages representing current state of alarms may optionally also be sent at
1580 other times, as for example on a periodic timed basis, or when systems are restarted and a list of currently active alarms is sent out by the Alarm Reporter to refresh the Alarm Manager.

Facet 4. Alarm current state

The value of the AlarmState facet reflects whether the alarm condition currently exists (inactive or active) or if the alarm condition formerly existed, does not now exist, but is "latched" or held
1585 by the alarm source so that caregivers may be notified of transient but significant conditions.

Figure 3.Z.7.5-3: Alarm Current State

Facet 5. Inactivation state

1590 The AlarmInactivationState reflects the current state of the visual and aural alarm indications at the alarm source.

This may be empty. May contain the value 'enabled', meaning that both visual and aural alarm indications are enabled at the device. May be repeated, to indicate separately the state of visual indications at the device by including zero or one of the values:

1595 • alarm-paused

• alarm-off

and zero or one of the values:

• audio-paused

• audio-off

1600 If neither 'alarm-paused' nor 'alarm-off' is included, the visual alarm indication is assumed to be enabled regardless of whether 'enabled' is also present.

If neither 'audio-paused' nor 'audio-off' is included, the aural alarm indication is assumed to be enabled regardless of whether 'enabled' is also present.

Facet 6. Real-time location

1605 Optional. Real time location data concerning the patient, if available.

Applicable where there are technical means to determine the current location of the patient, as distinct from the administratively assigned location that may be present in segment PV1. The Observation Value for this facet is based upon a combination of digital and site agreed named references with the digital information based upon the World Geodetic System (WGS) either

---

1610 1984 or 2004. Additionally each digital data component should optionally include a metric distance based margin for error.

Facet 7. Evidentiary data

This facet encodes an array of real-time measurements typically representing a physiological waveform meant to be rendered by the Alarm Manager or Alarm Communicator at the endpoint
1615 device to assist the caregiver in assessing the condition of the patient that the alarm is for. The normative description of the data is found in the Waveform Content Message (WCM) message content document.

3.Z.7.6 OBX-6 Units (CE) 00574

This field specifies the units associated with the observed value.

1620 ### 3.Z.7.7 OBX-7 References Range (ST) 00575

The range of values for Observation Value. The Alarm Manager (AM) actor does not use this field to analyze or indicate whether an alarm is due to an abnormal or critical value in the Observation Value. Instead the Abnormal Flags field is used.

3.Z.7.8 OBX-8 Abnormal Flags (IS) 00576

1625 This field may be repeated and can contain zero or more abbreviations indicating different facets of the abnormality of a result, including the type of abnormality (using predefined abbreviations from the table of values in the HL7 standard), and also values from the tables below alarm priority and whether the alarm is physiological or technical (AlarmType).

1630

Alarm priority

Figure 3.Z.7.8-1: Alarm Priority and Type

AlarmPriorityIEEE is displayed for reference, to show the correspondence between the
combined encoding for priority and source used in ISO/IEEE-1073 and the separate encodings
used in this Profile.

The following abbreviations in the OBX-8 Abnormality Flags field can be used to indicate the
type of abnormality, its priority as indicated by the source patient care device, and whether it is a
physiological alarm based on monitoring observations from the patient, or a technical alert
indicating a condition of the patient care device and not the patient which nonetheless requires
caregiver action.

Table 3.Z.7.8-2: Abnormal Flags, Abnormality Types

Abnormality Type	Abbreviation
Normal, not abnormal	N
Below low normal	L
Below lower panic limits	LL
Above high normal	H
Above higher panic limits	HH
Abnormal (for non-numeric results)	A

1635

1640

1645

Table 3.Z.7.8-3: Abnormal Flags, Alarm Priority

Alarm Priority	Abbreviation
no-alarm	PN
low priority	PL
medium priority	PM
high priority	PH

Table 3.Z.7.8-4: Abnormal Flags, Alarm Source

Alarm Source	Abbreviation
physiological	SP
technical	ST

1650

This is a repeatable field and values from the above table may be combined by entering them as repetitions of the field, for example, a field value of 'H~PH~SP' would signify a physiological measurement with an abnormally high value, constituting a high priority alarm condition.

3.Z.7.9 OBX-14 Observation Date/Time

The OBX segment of the Source Identification facet shall populate this field with the timestamp of the event transition this alarm represents (for example, the start time for an alarm start message, the end time for an alarm end message, and so forth). This is to be distinguished from the time the message was sent, which is carried in OBR-7.

1655

3.Z.7.10 OBX-18 Equipment Instance Identifier (EI) 01479

This field uniquely identifies the Alarm Reporter source of the alarm, preferably an EUI-64 (see base document).

1660 ### 3.Z.8 NTE Notes and Comment Segment

For indicated issues not addressed in information normative locations under agreement between the AR and AM actors. Site or system specific indications are optionally passed in this manner to the AM for dispatch decision making or through the AM to the AC to communications endpoints.

1665 **Table 3.Z.8-1: HL7 Attribute Table – NTE – Notes and Comment**

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM#	ELEMENT NAME
3	65536	FT	O	Y		00098	Comment

3.Z.8.1 NTE-3 Comment (FT) 00098

This field contains the comment contained in the segment.

___

3.Z.9 Capture of WCTP 1.3 update 1

1670   This section is a capture of the protocol definition, guidelines, and usage constraints of Wireless Communication Transfer Protocol (WCTP).

3.Z.9.1 Pre-Configuration

The HTTP source to destination is assumed to be resolved through pre-configuration.

Whether or not secure http (HTTPS) is used or not is resolved through pre-configuration

1675   The WCTP PollerID and security password used to identify the message send requestor (not the request itself) are assumed to be resolved through pre-configuration.

The URI values for the WCTP senderID and sendResponseToID are assumed to be resolved through pre-configuration.

3.Z.9.2 Endpoint Device Addressing

1680   Endpoint entity (wireless device) addressing can be per WCTP (often the phone number of the endpoint device), but in any event it is presumed to be pre-configured so that there is a match from Alarm Manager (AM) to Alarm Communicator (AC).

3.Z.9.3 Polling Versus Push Responses

The decision as to whether polling or push response is used for status updates is assumed to be
1685   resolved through pre-configuration. WCTP would be best used in its web push response form rather than polling for responses so as to maintain responsiveness of status updates and replies.

Some WCTP implementations have minimum tolerable poll intervals to reduce overall polling of the WCTP gateway server, the Alarm Communicator (AC).

3.Z.9.4 Constraints

1690   The use of WCTP for ACM does not require Message Response Redirection.

Sub-second timing is not expected to be needed by ACM use of WCTP.

The WCTP messageID is used to track the status of a message that was sent from the AM to the AC.

The WCTP notifyWhen element should indicate notifyWhenDelivered (notify upon delivery to
1695   device) and notify upon read receipt.

If WCTP version query is not supported then a request for version query must not be ignored. It must be responded to with a Not Supported WCTP confirmation response.

3.Z.9.5 Transactions

1700

Table 3.Z.9.5-1: WCTP requests and responses

Request	AC actor (WCTP Server)	AM actor (WCTP Client)	Needed
	Receives	Submits	
wctp-ClientQuery	Yes	No	No (polling)
wctp-LookupSubscriber	Yes	No	No
wctp-LookupResponse	No	Yes	No
wctp-DeviceLocation	Yes	No	No
wctp-DeviceLocationResponse	No	Yes	No
wctp-MessageReply	Yes	Yes	Yes
wctp-PollForMessages	Yes	No	No
wctp-ReturnToSvc	Yes	No	Yes
wctp-SendMsgMulti	Yes	No	No
wctp-StatusInfo	Yes	Yes	No
wctp-SubmitClientMessage	Yes	No	Yes
wctp-SubmitRequest	Yes	Yes	No
wctp-VersionQuery	Yes	Yes	Yes

Appendix 'X' Example Messages

Alarm Communications Management Sample messages

1705

Numeric Alarm

Patient Monitoring Device, Low SPO2 Alarm Indication, Start

1710   MSH|^~\&|MINDRAY_EGATEWAY^00A037EB2175780F^EUI-64|MINDRAY|AM_PHILIPS_IEM|PHILIPS|20120111150457-0600||ORU^R40^ORU_R40|1|P|2.6|||NE|AL||UNICODE UTF-8|||IHE_PCD_ACM_001^IHE PCD^1.3.6.1.4.1.19376.1.6.1.4.1^ISO

PID|||HO2009001^^^Hospital^PI||Hon^Albert^^^^^L||18991230|M\0D
1715   PV1||I|HO Surgery^OR^1\0D
OBR|1|1^MINDRAY_EGATEWAY^00A037EB2175780F^EUI-64|1^MINDRAY_EGATEWAY^00A037EB2175780F^EUI-64|69952^MDC_DEV_MON_PT_PHYSIO_MULTI_PARAM^MDC|||20120111150457-0600

OBX|1|ST|196670^MDC_EVT_LO^MDC|1.3.1.150456.1|Low SpO2|||L~PM~SP|||R|||20120111150457-
1720   0600||||F1519EFX^SHENZHEN_DEVICE^mindray.com^DNS

OBX|2|NM|150456^MDC_PULS_OXIM_SAT_O2^MDC|1.3.1.150456.2|88|262688^MDC_DIM_PERCENT^MDC|90-96||||R|||20120111150457-0600

OBX|3|ST|EVENT_PHASE^EVENT_PHASE|1.3.1.150456.3|start||||||R

OBX|4|ST|ALARM_STATE^ALARM_STATE|1.3.1.150456.4|active||||||R

1725

Qualitative Alarm

Infusion Pump, Fluid Line Occlusion, Alarm Indication Start

1730   MSH|^~\&|PAT_DEVICE_BBRAUN^0012211839000001^EUI-
64|BBRAUN|AM_Philips_IEM|Philips|20120109175417-
0600||ORU^R40^ORU_R40|6346172845752460251|P|2.6|||NE|AL||ASCII|EN^English^ISO659||
^^1.3.6.1.4.1.19376.1.6.1.4.1^ISO

PID|||HO2009003^^^AA1^PI||Hon^Amy^^^^^L|Coburn^^^^^^L|19610301000000-
1735   0600|F\0DPV1||I|HO 3 West ICU^10^1

OBR|1|634617284575713662^PAT_DEVICE_BBRAUN^0012211839000001^EUI-
64|P6013_4^PAT_DEVICE_BBRAUN^0012211839000001^EUI-
64|Heparin^Heparin|||20120109175417-0600

OBX|1||196940^MDC_EVT_FLUID_LINE_OCCL^MDC|1.0.0.0.1|||||||R|||||||P6013^^001221000
1740   0000000^EUI-64

OBX|2||69985^MDC_DEV_PUMP_INFUS_MDS^MDC|1.0.0.0.2|||||||X|||20120109175417-0600

OBX|3|ST|EVENT_PHASE^EVENT_PHASE|1.0.0.0.3|start||||||R

OBX|4|ST|ALARM_STATE^ALARM_STATE|1.0.0.0.4|active||||||R

1745   **Infusion Pump, Fluid Line Occlusion, Alarm Indication, End**

MSH|^~\&|PAT_DEVICE_BBRAUN^0012211839000001^EUI-
64|BBRAUN|AM_Philips_IEM|Philips|20120109175426-
0600||ORU^R40^ORU_R40|6346172846620706282|P|2.6|||NE|AL||ASCII|EN^English^ISO659||
1750   ^^1.3.6.1.4.1.19376.1.6.1.4.1^ISO
PID|||HO2009003^^^AA1^PI||Hon^Amy^^^^^L|Coburn^^^^^^L|19610301000000-
0600|F\0DPV1||I|HO 3 West ICU^10^1

OBR|1|634617284662070628^PAT_DEVICE_BBRAUN^0012211839000001^EUI-
64|P6013_4^PAT_DEVICE_BBRAUN^0012211839000001^EUI-
1755   64|Heparin^Heparin|||20120109175426-0600

OBX|1||196940^MDC_EVT_FLUID_LINE_OCCL^MDC|1.0.0.0.1|||||||R|||||||P6013^^001221000
0000000^EUI-64

OBX|2||69985^MDC_DEV_PUMP_INFUS_MDS^MDC|1.0.0.0.2|||||||X|||20120109175426-0600

OBX|3|ST|EVENT_PHASE^EVENT_PHASE|1.0.0.0.3|end||||||R

1760   OBX|4|ST|ALARM_STATE^ALARM_STATE|1.0.0.0.4|inactive||||||R

IHE Patient Care Device Technical Framework Supplement – Alarm Communication
Management (ACM)

Appendix 'X+1' AM – AC Communication WCTP Protocol Transactions

The following appendix covers the messages exchanged between an IHE PCD ACM AM actor
and an AC actor using the WCTP protocol

Abbreviations and definitions

HTTP – HyperText Transport Protocol

WCTP – Wireless Communications Transfer Protocol – the protocol between the ACM AM and
the ACM AC actors.

MCR (Multiple Choice Response) – the means to pass a message with selectable responses from
the ACM AM to the ACM AC actor.

XML – eXtensible Markup Language

2   IHE PCD Prerequisite Information

1775
- IHE PCD TF
- IHE PCD WCM profile TI

What is WCTP

1780   WCTP is the protocol between the ACM AM and the ACM AC actors. It makes use of an optionally securable (authentication and encryption) HTTP transport layer to convey XML-based WCTP protocol exchanges between a WCTP client (the ACM AM) and the WCTP server (the ACM AC).

WCTP XML Element Common Data Items

1785   Some message exchanges are administrative in nature, similar to TCP open, accept, and acknowledgement messages which are not documented as a part of HL7, while others have a direct and obvious place in the ACM profile as transactions, such as PCD-06 and PCD-07.

Please note, XML constant strings are presented in normal text. XML data to be filled in during implementation is presented in **bold red** text.

1790

The format of WCTP conformant timestamps (**timestamp**) is: yyyy-mm-ddThh:mm:ss.ttt

All times are UTC. WCTP does not support the ability to indicate a time zone offset.

Hours (**hh)** in 24-hour format, and **.ttt** is the optional number of milliseconds

Example: 2011-01-19T20:33:52

1795

A **push response URI** is the URI (URL minus the HTTP://) used to identify the HTTP POST destination for WCTP replies and status updates.

The **notification text** value is the actual text message to be presented to the wireless device
1800   operator.

The **sender ID** is the security identification of the IHE ACM actor to the WCTP receiver.

The **security code** is essentially the password to go with the security sender ID.

1805

The **message ID** is the identification of the overall message to the ACM AC by the AM.

The **transaction ID** is the lower level transaction identification making up the message.

1810   The **recipient PIN** is the identification of the destination device as per the ACM AC.

The **e-mail address** is the optional ACM AM contact information e-mail address.

The **phone number** is the optional ACM AM contact information voice telephony phone
1815   number.

The **web site** is the optional ACM AM contact information web site.

The **info string** is the optional ACM AM contact information comment.
1820

The **priority** is any of HIGH, NORMAL, or LOW with a default of NORMAL.

The **sequence number** is a sequential value used for tracking polling requests and responses used during Virtual Pre-Connectathon testing.
1825

The **batch size** is the numeric maximum count of responses a WCTP client (ACM AM) expects from a WCTP poll request to a WCTP server (ACM AC). A common value is 500.

The **WCTP version** indicates the expected version of WCTP XML message content supported.
1830

Table 2-1: WCTP version values

Value	Indicating WCTP version	MCR support
wctp-dtd-v1r1	1.1	None
wctp-dtd-v1r2	1.2	Unpaired
wctp-dtd-v1r3	1.3	Paired

The **WCTP DTD** identifies the URL of the DTD (Data Type Definition) for the indicated
version of WCTP supported.

1835

Table 2-2: WCTP DTD values

Value	Indicating WCTP version	MCR support
http://dtd.wctp.org/wctp-dtd-v1r1.dtd	1.1	None
http://dtd.wctp.org/wctp-dtd-v1r2.dtd	1.2	Unpaired
http://dtd.wctp.org/wctp-dtd-v1r3.dtd	1.3	Paired

The **Next Poll Interval** is the number of seconds the ACM AM (WCTP client) should wait
before again polling the ACM AC (WCTP server). The ACM AC (WCTP server) dictates this
value to reduce the aggregate polling load on the WCTP server by all WCTP polling clients.
1840   Given that there are typically not many ACM AM instances per ACM AC instance this interval
can be kept to a small single digit number of seconds. In typical WCTP wide area
communication deployment there are often hundreds if not maybe thousands of WCTP clients
per WCTP server.

1845   The **graphics format** indicates the format of the graphical image information, and the value can
be any one of SVG, JPEG, PNG, or BMP as agreed between the ACM AM actor vendor and the
ACM AC actor vendor.

The **graphical image** is a base-64 encoded string representing one of the WCM static graphical
1850   images represented by one of the sets of WCM evidentiary data from the ACM PCD-04 message
sent from the ACM AR to the ACM AM.

The **telephony dial string** is an encoded telephony dial string, including any required prefixes,
area codes, PBX switch hops, or pauses needed to permit the ACM AC endpoint communication
1855   device operator to make a telephone call from that device back to a patient's room or to the
observation producer/order filler.

The **status update** is the string indicating the type of status update that the ACM AC is reporting
back to the ACM AM in wctp-Notification. Possible values are as QUEUED, DELIVERED, or
1860   READ. Additionally there are the optional IHE PCD ACM profile specific values for
IHEPCDCALLBACKSTART and IHEPCDCALLBACKEND in support of Call Back Number
phone dialing by the operator of the ACM AC endpoint communication device and the resulting
telephony call start and call end, the status of which are useful as logged items in alarm response
analysis.

1865

The **Send Choice n** is the prompt component of an MCR request. This is the value used by the ACM AC to populate buttons, softkeys, or menu choices on the endpoint communication device for selection by the device operator. There can be multiple.

1870   The **Reply Choice n** is the response value component of an MCR request. This value is correlated with its same ordinal occurrence **Send Choice n** value.

The **response text** is the string sent by the endpoint communication device of the ACM AC back to the ACM AM as the response to a notification message sent from the ACM AM to the ACM
1875   AC. In the case of an MCR response the text can be predefined. In the case of non-MCR responses the text can be an unexpected value.

3   WCTP client–server messages and responses

Sections are indicated as **message classification – message type – usage indication**

1880

The **message classification** is either **Administrative** or the IHE PCD ACM message (PCD-06,
PCD-07, etc.)

The **messages type** is the WCTP interface specification operation types.

1885

The **usage indication** is used to distinctively indicate different uses for the same IHE PCD ACM
message, like when MCR is not supported, supported but unpaired, or supported and paired, or to
convey ACM profile proprietary extensions to WCTP like those needed to convey WCM
information from the ACM AM to the ACM AC.

1890   3.1 Administrative - wctp-VersionQuery

This message is used to determine whether or not the WCTP server, the ACM AC actor, supports
Multiple Choice Response (MCR) pairs on SubmitRequest messages. See WCTP version above.

<?xml version="1.0"?>

1895   <!DOCTYPE wctp-Operation SYSTEM "**WCTP DTD**" >

<wctp-Operation wctpVersion="**WCTP version**">

   <wctp-VersionQuery inquirer="**push response URI**" listDTDs="yes"/>

</wctp-Operation>

3.2 Administrative - wctp-VersionResponse

1900   This message is used when **VersionQuery** operation is not supported.

<?xml version="1.0"?>

<!DOCTYPE wctp-Operation SYSTEM "**WCTP DTD**">

<wctp-Operation wctpVersion="**WCTP version**" wctpToken="11AA">

1905   <wctp-Confirmation>

       <wctp-Failure errorCode="300" errorText="Operation not supported.">

       </wctp-Failure>

</wctp-Confirmation>

</wctp-Operation>

1910

The assumption to this response is that the ACM AM is to use only WCTP 1.1 XML messages and not later, e.g. is no support for MCR.

3.3 Administrative - wctp-VersionResponse

1915   This message is used when **Version Query** operation is supported.

<?xml version="1.0" encoding="utf-8"?>

<!DOCTYPE wctp-Operation SYSTEM "**WCTP DTD**">

<wctp-Operation wctpVersion="**WCTP version**">

1920   <wctp-VersionResponse inquirer="**push response URI**" responder="**responder name**" dateTimeOfRsp="**timestamp**" dateTimeOfReq="**timestamp**" invalidAfter="**timestamp**">

   <wctp-ContactInfo email="**e-mail address**" phone="**phone number**" www="**web site**" info="**info string**" />

   <wctp-DTDSupport supportType="Supported" dtdName="**WCTP version**"
1925   verToken="11AA" />

   </wctp-VersionResponse>

</wctp-Operation>

A response dtdName of "wctp-dtd-v1r3" indicates support for ACM profile conformant WCTP
1930   version 1.3 which indicates support for Multiple Choice Response (MCR) pairs on WCTP SubmitRequest messages. MCR pairs are used to populate soft keys on wireless device operator interfaces and so that the reply value can be vendor specific and still be presented in a vendor agnostic manner. A response of dtdName of "wctp-dtd-v1r2" indicates support for WCTP 1.2 which supports non-paired MCR.

1935   3.4   IHE PCD-06 - wctp-SubmitRequest – no MCR

This message is used to send a message from the ACM AM to the ACM AC when MCR is not to
be indicated because this is either a test message or the ACM AC does not support MCR.

```
<?xml version="1.0"?>
```
1940
```
<!DOCTYPE wctp-Operation SYSTEM "WCTP DTD">

<wctp-Operation wctpVersion="WCTP version">

  <wctp-SubmitRequest>

    <wctp-SubmitHeader submitTimestamp="timestamp">

      <wctp-Originator senderID="sender ID" securityCode="security code"/>
```
1945
```
      <wctp-MessageControl messageID="message ID" transactionID="transaction ID"
allowResponse="true" deliveryPriority="priority" notifyWhenDelivered="true"
preformatted="true"/>

      <wctp-Recipient recipientID="recipient PIN"/>

    </wctp-SubmitHeader>
```
1950
```
    <wctp-Payload>

      <wctp-Alphanumeric>notification text</wctp-Alphanumeric>

    </wctp-Payload>

  </wctp-SubmitRequest>

</wctp-Operation>
```

1955   3.5   IHE PCD-06 - wctp-SubmitRequest – Unpaired MCR

This message is used when the ACM AM wants to send a message to the ACM AC and while
MCR is to be indicated the ACM AC does not support paired MCR so unpaired MCR is used.

```
<?xml version="1.0"?>
```
1960
```
<!DOCTYPE wctp-Operation SYSTEM "WCTP DTD">

<wctp-Operation wctpVersion="WCTP version">

  <wctp-SubmitRequest>

    <wctp-SubmitHeader submitTimestamp="timestamp">

      <wctp-Originator senderID="sender ID" securityCode="security code"/>
```

```
1965        <wctp-MessageControl messageID="message ID" transactionID="transaction ID"
        allowResponse="true" deliveryPriority="priority" notifyWhenDelivered="true"
        preformatted="true" notifyWhenRead="true"/>

            <wctp-Recipient recipientID="recipient PIN"/>

        </wctp-SubmitHeader>

1970        <wctp-Payload>

            <wctp-MCR>

                <wctp-MessageText>notification text</wctp-MessageText>

                <wctp-Choice>Accept</wctp-Choice>

                <wctp-Choice>Reject</wctp-Choice>

1975            </wctp-MCR>

        </wctp-Payload>

    </wctp-SubmitRequest>

</wctp-Operation>
```

1980 When using unpaired MCR the wctp-Choice value selected by the endpoint device operator is the response data from the WCTP server (the ACM AC) back to the WCTP client (the ACM AM).

3.6 IHE PCD-06 - wctp-SubmitRequest – Paired MCR

This message is used to send a message from the ACM AM to the ACM AC when the ACM AC
1985 supports paired MCR.

```
<?xml version="1.0"?>

<!DOCTYPE wctp-Operation SYSTEM "WCTP DTD">

<wctp-Operation wctpVersion="WCTP version">

1990    <wctp-SubmitRequest>

        <wctp-SubmitHeader submitTimestamp="timestamp">

            <wctp-Originator senderID="sender ID" securityCode="security code"/>

            <wctp-MessageControl messageID="message ID" transactionID="transaction ID"
        allowResponse="true" deliveryPriority="priority" notifyWhenDelivered="true"
1995    preformatted="true" notifyWhenRead="true"/>

            <wctp-Recipient recipientID="recipient PIN"/>
```

```
        </wctp-SubmitHeader>
        <wctp-Payload>
          <wctp-MCR>
2000          <wctp-MessageText>notification text</wctp-MessageText>
              <wctp-ChoicePair>
                <wctp-SendChoice>Send Choice 1</wctp-SendChoice>
                <wctp-ReplyChoice>Reply Choice 1</wctp-ReplyChoice>
              </wctp-ChoicePair>
2005          <wctp-ChoicePair>
                <wctp-SendChoice> Send Choice 2</wctp-SendChoice>
                <wctp-ReplyChoice Reply Choice 2</wctp-ReplyChoice>
              </wctp-ChoicePair>
              <wctp-ChoicePair>
2010            <wctp-SendChoice> Send Choice 3</wctp-SendChoice>
                <wctp-ReplyChoice> Reply Choice 3</wctp-ReplyChoice>
              </wctp-ChoicePair>
          </wctp-MCR>
        </wctp-Payload>
2015    </wctp-SubmitRequest>
      </wctp-Operation>
```

When using a paired MCR the selectable values presented to the endpoint device operator are in the wctp-SendChoice elements. Once selected the correlated reply value sent to the WCTP client (the ACM AM) is in the wctp-ReplyChoice element.

3.7 IHE PCD-06 wctp-SubmitRequest – WCM

The following ACM profile proprietary extensions to the wctp-SubmitRequest are used to convey WCM content from the ACM AM to the ACM AC.

2025

The WCTP 1.3r1 interface specification that is the basis for ACM AM – AC communication supports neither non-plain text messages (encoded attachments) in addition to plain text messages or transmissions of graphical images in addition to plan text messages. For this reason the ACM profile is required to extend the WCTP 1.3r1 interface specification in a backward transparent manner in order to convey the HL7 evidentiary data associated with WCM (for ECG waveform graphic generation by the ACM AC) or to convey a graphical image of the HL7 evidentiary data as produced by the ACM AM for delivery to a non-regulated medical device ACM AC.

2030

In order for the WCTP server (the ACM AC actor) to signal its willingness to receive and potentially support these IHE ACM profile WCM specific extensions to WCTP 1.3r1, per the extensions mechanism defined in section 3.6 Protocol Version of the WCTP 1.3r1 interface specification, the DTD response value shall be "IHEPCD-PCD06-V1R1" to indicate support for reception of either or both of the PCD-04 (HL7 evidentiary data) or a graphical image representative of the evidentiary data. This version shall presume at a minimum WCTP version 1.3r1 capabilities, with primary emphasis on the ability of the WCTP server (ACM AC actor) to support paired MCR if sent in a wctp-SubmitRequest message from the WCTP client (the ACM AM actor) to the WCTP server (the ACM AC actor).

2035

2040

On wctp-SubmitRequest messages the WCTP 1.3r1 interface specification supports a choice of one of wctp-Alphanumeric (simple text with no MCR), wctp-TransparentData (binary encoded data), or wctp-MCR (simple text accompanied with either unpaired or paired MCR). Since only smarter devices, associated with the newest WCTP implementations, are expected to make use of the additional WCM information in the PCD-06 transaction and so as to offload simple non-MCR message WCTP implementations from having to ignore the extensions, the wctp-MCR element tree has been selected as the extension point for the WCM related additional XML elements.

2045

2050

        <wctp-IHEPCD04 xmlns="urn:ihe:pcd:acm:2012">

2055   **IHE PCD-04 HL7 message**

        </wctp-IHEPCD04>

        <wctp-IHEPCDWCMImages>


```
<wctp-IHEWCMImage Format="graphics format" Encoding="base64">
            graphical image
</wctp-IHEWCMImage>
</wctp-IHEPCDWCMImages >
```

2065 The IHE PCD-04 HL7 message may or may not contain WCM evidentiary data, but it is expected to contain ACM alarm indication data.

2070 Since a single PCD-04 WCM extension can result in more than a single graphics image the wctp-IHEWCMImage can be repeated. Due to endpoint communication device display real estate limitations the ACM AC may not be able to display all of the images presented to it by the ACM AM, but shall present the images starting with the first for as many as the ACM AC supports for the given endpoint communication device.

Whether or not the ACM AM sends the rendered images to the ACM AC is ACM AM vendor specific.

2075

The Format specification is required, indicates the format of the graphical image information, and the value can be any one of SVG, JPEG, PNG, or BMP as agreed between the ACM AM actor vendor and the ACM AC actor vendor.

2080 If the ACM AC does not respond to the wctp-VersionQuery with the WCM supportive DTD response indicating value then the AM shall not send these extensions to the AC.

3.8 IHE PCD-06 wctp-SubmitRequest – Call Back Phone Number

The following ACM profile proprietary extensions to the wctp-SubmitRequest are used to
2085   convey the HL7 Call Back Phone Number from the ACM AM to the ACM AC.

The WCTP 1.3r1 interface specification that is the basis for ACM AM – AC communication
does not support the ability to pass other than a client request contact phone number in
association with a message submit request. For this reason the ACM profile is required to extend
2090   the WCTP 1.3r1 interface specification in a backward transparent manner in order to convey the
HL7 Call Back Phone Number (OBR-17) from the ACM PCD-04 HL7 message received by the
ACM AM from the ACM AR for sending to the ACM AC.

In order for the WCTP server (the ACM AC actor) to signal its willingness to receive and
2095   potentially support these IHE ACM profile WCM specific extensions to WCTP 1.3r1, per the
extensions mechanism defined in section 3.6 Protocol Version of the WCTP 1.3r1 interface
specification, the DTD response value shall be "IHEPCD-PCD06-V1R1" to indicate support for
reception of the Call Back Phone Number extension to WCTP 1.3r1. This version shall presume
at a minimum WCTP version 1.3r1 capabilities, with primary emphasis on the ability of the
2100   WCTP server (ACM AC actor) to support paired MCR if sent in a wctp-SubmitRequest message
from the WCTP client (the ACM AM actor) to the WCTP server (the ACM AC actor).

On wctp-SubmitRequest messages the WCTP 1.3r1 interface specification supports a choice of
one of wctp-Alphanumeric (simple text with no MCR), wctp-TransparentData (binary encoded
2105   data), or wctp-MCR (simple text accompanied with either unpaired or paired MCR). Since only
smarter devices, associated with the newest WCTP implementations, are expected to make use of
the additional WCM information in the PCD-06 transaction and so as to offload simple non-
MCR message WCTP implementations from having to ignore the extensions, the wctp-MCR
element tree has been selected as the extension point for the WCM related additional XML
2110   elements.

In order to pass the Call Back Phone Number used for the ACM nurse call use case for telephony
call back to the patient in the room, or for the ACM laboratory results/observations use case for
telephony call back to the results provider/order filler for any required results/observation read
2115   back, the following additional WCTP XML element is defined specifically to pass the telephony
dial back string from the ACM AM to the ACM AC by means able to be more deterministically
referenced than simply including the string in the message text sent to the endpoint
communication device operator.

2120   <wctp-IHEPCDDialback String="**telephony dial string**" />

3.9 IHE PCD-07 - Synchronous response to wctp-SubmitRequest – Received by communications status update

This message is used by the ACM AC to convey immediate request status responses to the ACM
AM while the submit request initiating TCP connection is still open. This is the means by which
the PCD-07 status indication of **Received by communications**

(accepted by WCTP gateway) is conveyed from the ACM AC to the ACM AM.

The following is an indication of the successful queuing of a message from the ACM AM to the
ACM AC.

```
<?xml version="1.0"?>

<!DOCTYPE wctp-Operation SYSTEM "WCTP DTD">

<wctp-Operation wctpVersion="WCTP version" wctpToken="11AA">

    <wctp-Confirmation>

        <wctp-Success successCode="200" successText="Accepted">comment</wctp-Success>

    </wctp-Confirmation>

</wctp-Operation>
```

The following is an indication of the failed attempt to queue a message from the ACM AM to the
ACM AC.

```
<?xml version="1.0"?>

<!DOCTYPE wctp-Operation SYSTEM "WCTP DTD">

<wctp-Operation wctpVersion="WCTP version" wctpToken="11AA">

    <wctp-Confirmation>

        <wctp-Failure errorCode="500" errorText="Timeout">comment</wctp-Failure>

    </wctp-Confirmation>

</wctp-Operation>
```

Refer to the WCTP interface specification for all possible values for successCode and successText as well as errorCode and errorText.

3.10 For Pre-Connectathon/Virtual Connectathon testing - wctp-PollForMessages – general poll

2155

In a Pre-Connectathon or Virtual Connectathon environment where firewalls may not permit the ACM AC to post asynchronous status updates and replies across the Internet there is a WCTP polling capability. As polling adds a potentially non-determinant delay in the ACM AM – AC interaction times the use of polling is not for use during IHE Connectathon testing nor should it be used in live deployments where the non-determinant delay could increase patient safety risk.

2160

The following poll is a general poll and not a poll for status or replies for any specific messages.

<?xml version="1.0"?>

2165 <!DOCTYPE wctp-Operation SYSTEM "**WCTP DTD**">

<wctp-Operation wctpVersion="**WCTP version**">

  <wctp-PollForMessages pollerID="**poller ID**" securityCode="**security code**" maxMessagesInBatch="**batch size**"/>

</wctp-Operation>

2170

3.11 For Pre-Connectathon/Virtual Connectathon testing - wctp-PollResponse – general poll

This is the general poll response sent by the ACM AC to the ACM AM when the poll response is that no messages have status updates or replies.

2175

```
<?xml version="1.0"?>

<!DOCTYPE wctp-Operation SYSTEM "WCTP DTD">

<wctp-Operation wctpVersion="1.0">
```

2180

```
    <wctp-PollResponse minNextPollInterval="Next Poll Interval">

        <wctp-NoMessages/>

    </wctp-PollResponse>

</wctp-Operation>
```

2185   3.12 For Pre-Connectathon/Virtual Connectathon testing - wctp-PollResponse (message status update)

This is the general poll response sent by the ACM AC to the ACM AM when the poll response is that a message has a status update. The value of **status update** can be any of "QUEUED", "DELIVERED", or "READ".

2190

```
<?xml version="1.0"?>

<!DOCTYPE wctp-Operation SYSTEM "WCTP DTD">

<wctp-Operation wctpVersion="1.0">

   <wctp-PollResponse minNextPollInterval="Next Poll Interval">

      <wctp-Message sequenceNo="sequence number">

         <wctp-StatusInfo>

            <wctp-ResponseHeader responseToMessageID="message ID"
responseTimestamp="timestamp">

            </wctp-ResponseHeader>

            <wctp-Notification type="status update" />

         </wctp-StatusInfo>

      </wctp-Message>

   </wctp-PollResponse>

</wctp-Operation>
```

2205

3.13 For Pre-Connectathon/Virtual Connectathon testing - wctp-PollResponse (message status update acknowledgement)

This is the poll response acknowledgement message sent from the ACM AM back to the ACM AC to let the AC know that the message status update has been successfully conveyed from the AC to the AM and that the AC can discard status updates for the messages.

2210

<?xml version="1.0"?>

<!DOCTYPE wctp-Operation SYSTEM "**WCTP DTD**">

<wctp-Operation wctpVersion="**WCTP version**">

2215   <wctp-PollForMessages pollerID="**poller ID**" securityCode="**security code**" maxMessagesInBatch="**batch size**">

<wctp-MessageReceived sequenceNo="**sequence number**">

<wctp-Success successCode="200" successText="Message accepted">**comment**</wctp-Success>

2220   </wctp-MessageReceived>

</wctp-PollForMessages>

</wctp-Operation>

3.14 For Pre-Connectathon/Virtual Connectathon testing - wctp-PollResponse (message reply, not in response to an MCR based wctp-SubmitRequest)

2225

<?xml version="1.0"?>

<!DOCTYPE wctp-Operation SYSTEM "**WCTP DTD**">

<wctp-Operation wctpVersion="1.0">

2230   <wctp-PollResponse minNextPollInterval="**Next Poll Interval**">

   <wctp-Message sequenceNo="**sequence number**">

    <wctp-MessageReply>

     <wctp-ResponseHeader responseToMessageID="**message ID**" responseTimestamp="**timestamp**">

2235   </wctp-ResponseHeader>

     <wctp-Payload>

      <wctp-Alphanumeric>**response text**</wctp-Alphanumeric>

     </wctp-Payload>

    </wctp-MessageReply>

2240   </wctp-Message>

  </wctp-PollResponse>

</wctp-Operation>

3.15 IHE PCD-07 asynchronous status update (DELIVERED - delivery confirmation)

2245   The value of **status update** would be "DELIVERED".

<?xml version="1.0" encoding="utf-16"?>

<!DOCTYPE wctp-Operation SYSTEM "**WCTP DTD**">

<wctp-Operation wctpVersion="**WCTP version**">

2250   <wctp-StatusInfo>

   <wctp-ResponseHeader responseTimestamp="**timestamp**" respondingToTimestamp="**timestamp**" onBehalfOfRecipientID="**recipient PIN**">

    <wctp-Originator senderID="**sender ID**" />

```
        <wctp-MessageControl messageID="message ID" transactionID="transaction ID" />
2255        <wctp-Recipient authorizationCode="" />
     </wctp-ResponseHeader>
     <wctp-Notification type="status update" />
   </wctp-StatusInfo>
</wctp-Operation>
2260
```

3.16 IHE PCD-07 asynchronous status update (READ - read receipt)

The value of **status update** would be "READ".

```
<?xml version="1.0" encoding="utf-16"?>
<!DOCTYPE wctp-Operation SYSTEM "WCTP DTD">
<wctp-Operation wctpVersion="WCTP version">
  <wctp-StatusInfo>
    <wctp-ResponseHeader responseTimestamp="timestamp"
respondingToTimestamp="timestamp" onBehalfOfRecipientID="recipient PIN">
      <wctp-Originator senderID="sender ID" />
      <wctp-MessageControl messageID="message ID" transactionID="transaction ID" />
      <wctp-Recipient authorizationCode="" />
    </wctp-ResponseHeader>
    <wctp-Notification type="status update" />
  </wctp-StatusInfo>
</wctp-Operation>
```

3.17 IHE PCD-07 asynchronous reply message with MCR

```
<?xml version="1.0" encoding="utf-16"?>
<!DOCTYPE wctp-Operation SYSTEM "WCTP DTD">
<wctp-Operation wctpVersion="WCTP version">
  <wctp-MessageReply MCRMessageReply="true">
    <wctp-ResponseHeader responseToMessageID="message ID"
responseTimestamp="timestamp" respondingToTimestamp="timestamp"
onBehalfOfRecipientID="recipient PIN">
      <wctp-Originator senderID="sender ID" miscInfo="" />
      <wctp-MessageControl messageID="message ID" transactionID="transaction ID" />
      <wctp-Recipient recipientID="recipient PIN" />
    </wctp-ResponseHeader>
    <wctp-Payload>
      <wctp-Alphanumeric>response text</wctp-Alphanumeric>
```

89

```
        </wctp-Payload>
    </wctp-MessageReply>
</wctp-Operation>
```

2295