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Ambulance Care Summary

Clinical Work Station Integration Guide

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1 INTRODUCTION

1.1 Overview

A Clinical Work Station (CWS) is a web-based portal used in most hospitals and by many primary healthcare clinicians. It provides an integrated view of a patient's medical record regardless of which system contains the individual components.

This document describes how to configure a CWS to access components held by the publicly-funded ambulance services; i.e. St John and Wellington Free Ambulance (WFA).

The objective is to allow non-ambulance clinicians (e.g. in a hospital) treating a person sometime after an ambulance contact to access a summary of that contact via their CWS.

1.2 The Ambulance Care Summary

The ambulance services operate a shared clinical record system, the 'electronic patient report form' or ePRF system.

A summary clinical record from ePRF is made available to authorised Clinical Work Stations. This is the 'Ambulance Care Summary' (ACS).

1.3 ACS/CWS Integration

A CWS must be configured to retrieve, format and display an ACS. The ACS remains in the ePRF system; the CWS accesses it through the ACS Web Service.

The routines described in this document can be used by any CWS that can make web services calls, for example *Orion Clinical Portal (OCP - previously called "Concerto")* and *CSC HealthViews*.

1.4 The ACS Web Service

The ACS Web Service allows a CWS to search for and retrieve Ambulance Care Summaries over the Connected Health Network.

Two functions are available:

1. List all ACSs available for a specified NHI Number and its aliases; the list returned conforms to HISO 10040¹
2. Return a specified ACS in PDF format; the ACS document content and structure is described in detail in HISO 10052²

¹ HISO 10040.4:2015. *Clinical Document Metadata Standard*; ISBN 978-0-478-44496-4 (online); Published in February 2015 by the Ministry of Health

² HISO 10052:2015. *Ambulance Care Summary Standard*; ISBN 978-0-478-44802-3 (online); Published in May 2015 by the Ministry of Health

2 CWS WORK FLOW

1. An Ambulance Officer treats a patient, creates an ePRF about the encounter and submits it to CareMonX; the ePRF includes the patient's NHI Number. The Patient may be left at scene or taken to hospital or somewhere else.
2. Sometime later – this could be minutes, days or months later:
 - a. A clinician (e.g. a doctor in ED, a consultant in outpatients' clinic) requests a list of available clinical documents for a patient (identified by NHI Number) through their organisation's CWS.

The CWS displays a list of available document types; each document type integrated with this particular CWS displays as a high-level node in the tree. If this particular CWS is integrated with CareMonX then there will be a node for Ambulance Care Summaries, e.g.:

- **Haematology**
- **Pathology**
- **Diagnostic Imaging**
- **Ambulance**
- **Referrals**

The CWS must be configured to include the 'Ambulance' node (including choosing the name of the node and its position in the list)

If the clinician selects the Ambulance node then the CWS sends a request for a list of ACSs to the CareMonX ACS Web Service.

- b. If the request is valid then the ACS Web Service returns a list of all ACSs held in CareMonX for the requested NHI Number and all of its aliases.

The CWS then displays the list, e.g.:

- **Haematology**
- **Pathology**
- **Diagnostic Imaging**
- **Ambulance**
 - Tue 09:45 Ambulance Care Summary**
 - Fri 22:17 Ambulance Care Summary**
 - 23 July 2018 Ambulance Care Summary**
- **Referrals**

The CWS must be configured to call the ACS Web Service and display the returned list

- c. The clinician may select one ACS from the list and the CWS sends a request to the CareMonX ACS Web Service for that ACS.
 - d. If the request is valid then the ACS Web Service returns the ACS in pdf format and it is displayed by the CWS.

The CWS must be configured to call the ACS Web Service and format and display the returned document

3. Reports of who accessed what and when are available to from the ambulance service to CWS administrators.

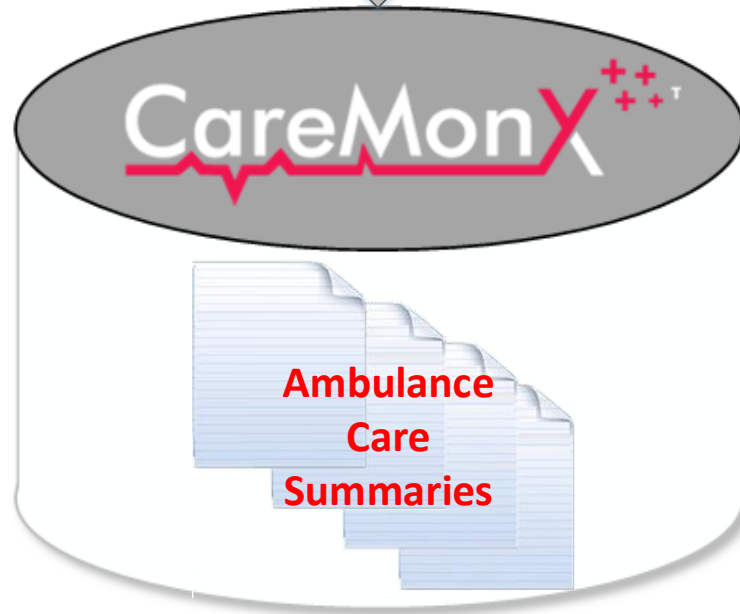


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1. Submit ePRF with an NHI Number





2a. Request a list of ACSs

2c. Request one ACS

CWS Integration


Hi it's the xxx DHB here, my password is yyy. My user zzz would like to see the list of ACSs for NHI=ABC1235

Hi it's the xxx DHB here, my password is yyy. My user zzz would like to see the ACS with code=AA-GHK-KWD-BN



OK, I know you. Here's the list:
- Tue 09:45 AA-GHK-KWD-BN Chest pain...
- Fri 22:17 LK-WBY-ARM-FT Shortness of...
- 23 July 2018 NJ-PLT-BYH-SY Fracture of...

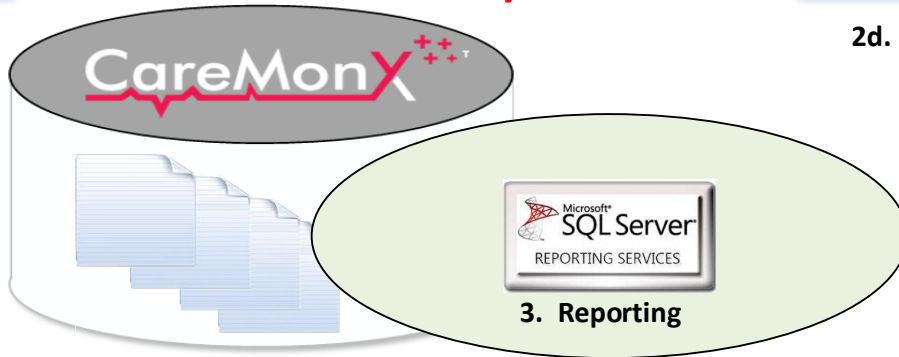
OK, I know you. Here's the ACS in pdf format:



Ambulance Care Summary Web Services

2b. Return the list of ACSs

2d. Return one ACS



3 AMBULANCE CARE SUMMARY WEB SERVICE

3.1 Web Service Architecture

The ACS Web Service is a REST (Representational State Transfer) web service.

3.2 Connectivity

A Connected Health Network connection is required. For more information refer to <http://healthitboard.health.govt.nz/about-us/connected-health/connected-health-network>

3.3 Resources

Each ACS is assigned a unique 10-character code - the “ACS Access Code”. This is the Uniform Resource Identifier (URI) to the resources exposed by the ACS Web Service. The associated natural key is the NHI number of the person who the ACS is about.

The base endpoint for the ACS Web Service is <https://cws.eacc.org.nz/acs>. This is the domain name on the Connected Health Network.

3.4 Operations on Resources

Operation	HTTPS GET Request
<u>List Ambulance Care Summaries for a Patient</u>	
Given an NHI Number, return a list of all ACSs held for that NHI Number and its aliases	<code>cws.eacc.org.nz/acs ?nhi=<NHINumber></code>
<u>View an Ambulance Care Summary</u>	
Return the ACS identified by its unique document identifier in PDF format	<code>cws.eacc.org.nz/acs ?handoverPIN=<documentURI> &format=<documentFormat></code>

3.5 Privacy and Security

Access to the ACS is governed by the *Health Information Privacy Code* (HIPC). This requires that health information is secured and protected from unauthorised disclosure.

3.5.1 Secure network communication

HTTPS is used to secure all network communication between Clinical Work Stations and the ACS Web Service.

3.5.2 Authentication and Access Control

HTTP Basic authentication is used for ACS Web Service requests. The calling CWS supplies the user identifier and password assigned to it by the ambulance service.

It is assumed that the CWS user has been authenticated in their local system and has the authority to access records about a patient, i.e. that any user accessing an ACS from a CWS is authorised to do so. There is a requirement therefore to authenticate the calling CWS and health care provider (i.e. “is this request from a system and an organisation that the ambulance service has agreed to share information with”) but not to authenticate the actual user.

3.5.3 Audit trail

The ePRF system keeps an audit trail of all queries directed to the ACS Web Service. The audit trail records when the transaction occurred and the identities of both the requesting organisation and the individual user. The user identifier of the individual logged-in to the CWS is passed in the ACS Web Service request and logged.

3.6 List Ambulance Care Summaries for a Patient

3.6.1 HTTPS Request

GET https://cws.eacc.org.nz/acs?nhi=<nhiNumber> HTTP/1.1

Content-type = application/xml

Accept = application/xml

Authorization: Basic <credential>

Notes

1. <nhiNumber> identifies the patient for whom details are required.
2. <credential> is constructed as follows:
 - <operatorId> is a unique identifier assigned by the ambulance service to each CWS; it is the name by which ePRF knows the CWS
 - <operatorPassword> is the password assigned by the ambulance service to the CWS identified by <operatorId>
 - <userId> is the CWS's internal unique identifier for the end-user making the request, i.e. the identifier used to log in to the CWS
 - the three fields above are separated by colons and combined into a string of the format "operatorId:operatorPassword:userId"
 - the resulting string is then encoded using the RFC2045-MIME variant of base64, except not limited to 76 characters per line, to form <credential> (see 4.3 Convert Credential to Base64)
3. It is recommended that the list is built immediately before it is opened in the CWS. This is to ensure that it is as accurate as possible because there is a chance that the ambulance service could change the NHI Number on a particular record.
4. The list of ACSs must not be relied on as a full and complete record of all ambulance contacts for a patient because:
 - not all ambulance clinical records contain an NHI Number
 - historical (paper) records have not been entered into the ePRF system

3.6.2 HTTPS Response

HTTP/1.1 <statusCode> <reasonPhrase>

Content-type = application/xml

Content-location /acs.stjohn.org.nz

<messageBody>

Notes

1. <statusCode> is one of the standard HTTP Response Status Codes: 2xx (Success), 4xx (Client error), 5xx (Server error)
2. <reasonPhrase> describes <statusCode>
3. <messageBody> is a list of metadata describing the Ambulance Care Summaries held by the ambulance service for the requested NHI Number and its aliases. The list conforms to HISO 10040 (see 3.6.3 below). An example is given in 4.1 (List ACSs for a Patient - Example Call and Response).

3.6.3 HISO 10040.4 Metadata

HISO 10040.4 Element Name	ACS Value	Notes
Patient identifier	<NHI Number>	
Health specialty code	"A02"	Description = Ambulance officer or paramedic See www.health.govt.nz/nz-health-statistics/data-references/code-tables/common-code-tables/health-specialty-code-table
Service start date/time	<At scene time>	Date/time the incident location was reached by the initial ambulance responder OR date/time an ambulance clinician first spoke to the patient if no vehicle was dispatched
Service finish date/time	<End time>	Date/time that the incident finished
Facility identifier	Value depends on which ambulance operator the ePRF author belongs to	Health Practitioner Index (HPI) Organisation Identifier
Facility type code	"26"	HPI facility type code for "Ambulance" See www.health.govt.nz/nz-health-statistics/data-references/code-tables/common-code-tables/facility-type-code-table
Author identifier	ePRF author's Staff Id	When ambulance officers become registered health practitioners this will be the author's HPI CPN; in the meantime, it is their ambulance staff identifier

HISO 10040.4 Element Name	ACS Value	Notes
Author clinical role code	Values depend on the Authority to Practice (ATP) level of the ePRF author: <ul style="list-style-type: none"> • 2=EMT • 3=PAR • 4=ICP • Otherwise empty 	HPI clinical role code These are the levels of ATP for ambulance officers defined in NZS8156 <ul style="list-style-type: none"> • EMT=Emergency Medical Technician; • PAR=Paramedic; • ICP=Intensive Care Paramedic
Approver identifier	<HPI Number>	HPI CPN of the appropriate Medical Director
Creation date/time	<At scene time>	Same as Service start date/time above
Repository identifier	"2.16.840.1.113883.2.18.35.7"	OID for the ambulance clinical record system issued by the HL7 New Zealand OID Registry
Document identifier	"2.16.840.1.113883.2.18.7.21.7." decimal(<ACS Access Code>)	Ambulance Care Summary OID concatenated with the ACS Access Code converted from base36 to decimal. The ACS Access Code is the unique identifier of this particular ACS
Document URI	"https://eacc.org.nz/acs/" <ACS Access code>	
Document type code	"74207-2"	LOINC code meaning "Pre-hospital summary"
Availability status code	"A"	Document is valid and available for patient care
Confidentiality code	"N"	Document has the usual level of confidentiality and should be treated as medical-in-confidence
Language code	"en-NZ"	English
Media type code	"application/xml"	CDA document
Document format code	"2.16.840.1.113883.2.18.7.21.7"	OID for Ambulance Care Summary issued by the HL7 New Zealand OID Registry

3.7 View an Ambulance Care Summary

3.7.1 HTTPS request

GET

https://cws.eacc.org.nz/acs?handoverpin=<documentURI>&format=<documentFormat> HTTP/1.1

Content-type = application/xml

Accept = application/xml

Authorization: Basic <credential>

Notes

1. <documentURI> is the unique identifier of the required Ambulance Care Summary.
2. <documentFormat> is the format in which the CWS wants to receive the ACS, must be PDF.
3. <credential> is constructed as follows:
 - <operatorId> is a unique identifier assigned by the ambulance service to each CWS; it is the name by which ePRF knows the CWS
 - <operatorPassword> is the password assigned by the ambulance service to the CWS identified by <operatorId>
 - <userId> is the CWS's internal unique identifier for the end-user making the request, i.e. the identifier used to log in to the CWS
 - The three fields above are separated by colons and combined into a string of the format "operatorId:operatorPassword:userId"
 - the resulting string is then encoded using the RFC2045-MIME variant of base64, except not limited to 76 characters per line, to form <credential> (see 4.3 Convert Credential to Base64)

3.7.2 HTTPS response

**HTTP/1.1 <statusCode> <reasonPhrase>
Content-type = application/xml
Content-location /acs.stjohn.org.nz
<messageBody>**

Notes

1. <statusCode> is one of the standard HTTP Response Status Codes: 2xx (Success), 4xx (Client error), 5xx (Server error)
2. <reasonPhrase> describes <statusCode>
3. <messageBody> if present contains the requested Ambulance Care Summary document in the PDF format. An example is given in 4.2 (View an ACS - Example Call and Response).

3.8 Software Development System

The ambulance services provide access to a test instance of the ePRF system. The Test ACS Web Service may be accessed as follows:

List Ambulance Care Summaries for a Patient

**GET https://cwsuat.eacc.org.nz/acs?nhi=<nhiNumber> HTTP/1.1
Content-type = application/xml
Accept = application/xml
Authorization: Basic <credential>**

View an Ambulance Care Summary

**GET
https://cwsuat.eacc.org.nz/acs?handoverpin=<documentURI>&format=<documentFormat> HTTP/1.1
Content-type = application/xml
Accept = application/xml
Authorization: Basic <credential>**

Notes

1. The call is the same; only the url is different
2. CWS credentials will be supplied by the ambulance service

4 APPENDIX

4.1 List ACSs for a Patient - Example Call and Response

4.1.1 Scenario

The ambulance services' ePRF system holds three Ambulance Care Summaries for Bob Bobson, NHI Number ABC1235.

The first, dated 17 December 2013, is from when Bob was taken to Happy Hospital ED from a car crash. He was unconscious on arrival at ED and had no identification on him so was allocated the temporary NHI Number XYZ9876. The paramedic saved the ambulance clinical record under that NHI Number and it was allocated the Access Code "QW-ERT-YUP-23".

The second, dated 14 June 2014, is from when Bob called the ambulance because he was having an asthma attack. Bob is a known asthmatic, and the condition did not raise any red flags, so the ambulance crew treated him at home and did not take him to a medical facility. The ambulance clinical record was stored under Bob's master NHI Number with the Access Code "EB-C4B-B7E-6C".

The third, from 16 June 2014, resulted from another asthma attack. This time Bob was seriously ill, so the ambulance took him to Sunshine Hospital ED. The ambulance clinical record was stored under Bob's master NHI Number with the Access Code "67-ZXC-VBN-M9".

Sunshine Hospital's Clinical Work Station is configured to access Ambulance Care Summaries. The ambulance service has allocated Sunshine Hospital the user identifier "SSHED" and password "lkjh0987".

Sally Smith is the Sunshine Hospital ED clinician treating Bob. She logs in to the Sunshine CWS with the user identifier "SALLY" and requests a list of Bob's Ambulance Care Summaries.

Note:

1. All of a patient's Ambulance Care Summaries are listed, no matter which NHI Number they are stored under.
2. All of a patient's Ambulance Care Summaries are listed, regardless of whether the patient was treated at scene (not transported) or transported to a facility other than the one making the request.

4.1.2 HTTPS Request

Sunshine CWS makes the following request:

```
GET https://cws.eacc.org.nz/acs?NHI=ABC1235 HTTP/1.1
Content-type = application/xml
Authorization: Basic V1NIRUQ6bGtqaDA5ODc6U0FMTFk=3
```

4.1.3 HTTPS Successful Response

The ACS Web Service responds as follows:

HTTP/1.1 **200 OK**

Content-type = application/xml

Content-location /acs.stjohn.org.nz

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<clinicalDocumentFeed>
```

```
<request>
```

```
<NHI>ABC1235</NHI>
```

```
<user>SALLY</user>
```

```
</request>
```

```
<entry>
```

```
<patientIdentifier>XYZ9876</patientIdentifier>
```

```
<healthSpecialtyCode>A02</healthSpecialtyCode>
```

```
<serviceStartDatetime>20131217112500</serviceStartDatetime>
```

```
<serviceFinishDatetime>20131217124700</serviceFinishDatetime>
```

```
<facilityIdentifier>G02780-A</facilityIdentifier>
```

```
<facilityTypeCode>26</facilityTypeCode>
```

```
<authorIdentifier>100320</authorIdentifier>
```

```
<authorClinicalRoleCode>EMT</authorClinicalRoleCode>
```

```
<approverIdentifier>17AHVX</approverIdentifier>
```

```
<!-- Requested NHI number -->
```

```
<!-- Requesting user's identifier in CWS -->
```

```
<!-- Actual NHI number -->
```

```
<!-- Date/time of call -->
```

```
<!-- End time -->
```

```
<!-- St John HPI Org Id -->
```

```
<!-- ePRF Author's Staff Id -->
```

```
<!-- Authority to practice -->
```

```
<!-- St John Medical director -->
```

³ see 4.3 Convert Credential to Base64


```

<creationDatetime>20131217112500</creationDatetime>                <!-- Date/time of call -->
<repositoryIdentifier>2.16.840.1.113883.2.18.35.7</repositoryIdentifier>
<documentIdentifier>2.16.840.1.113883.2.18.7.21.7.2731992073896030</documentIdentifier>
                                                                    <!-- ACS access code converted to decimal -->
<documentURI>https://acs.stjohn.org.nz/QWERTYUP23</documentURI>    <!-- ACS access code -->
<documentTypeCode>74207-2</documentTypeCode>
<availabilityStatusCode>A</availabilityStatusCode>
<confidentialityCode>N</confidentialityCode>
<languageCode>en-NZ</languageCode>
<mediaTypeCode>application/xml</mediaTypeCode>
<documentFormatCode>2.16.840.1.113883.2.18.7.21.7</documentFormatCode >
</entry>
<entry>
  <patientIdentifier>ABC1235</patientIdentifier>                    <!-- Actual NHI number -->
  <healthSpecialtyCode>A02</healthSpecialtyCode>
  <serviceStartDatetime>20140614111300</serviceStartDatetime>    <!-- Date/time of call -->
  <serviceFinishDatetime>20140614121000</serviceFinishDatetime> <!-- End time -->
  <facilityIdentifier>G02780-A</facilityIdentifier>                  <!-- St John HPI Org Id -->
  <facilityTypeCode>26</facilityTypeCode>
  <authorIdentifier>100901</authorIdentifier>                      <!-- ePRF Author's Staff Id -->
  <authorClinicalRoleCode>ICP</authorClinicalRoleCode>           <!-- Authority to practice -->
  <approverIdentifier>17AHVX</approverIdentifier>                 <!-- St John Medical director -->
  <creationDatetime>20140614111300</creationDatetime>            <!-- Date/time of call -->
  <repositoryIdentifier>2.16.840.1.113883.2.18.35.7</repositoryIdentifier>
  <documentIdentifier>2.16.840.1.113883.2.18.7.21.7.1453821363387010</documentIdentifier>
                                                                    <!-- ACS access code converted to decimal -->
                                                                    <!-- ACS access code -->
  <documentURI>https://acs.stjohn.org.nz/EBC4BB7E6C</documentURI>
  <documentTypeCode>74207-2</documentTypeCode>
  <availabilityStatusCode>A</availabilityStatusCode>
  <confidentialityCode>N</confidentialityCode>
  <languageCode>en-NZ</languageCode>
  <mediaTypeCode>application/xml</mediaTypeCode>
  <documentFormatCode>2.16.840.1.113883.2.18.7.21.7</documentFormatCode >
</entry>

```

```

<entry>
  <patientIdentifier>ABC1235</patientIdentifier>
  <healthSpecialtyCode>A02</healthSpecialtyCode>
  <serviceStartDatetime>20140616030500</serviceStartDatetime>
  <serviceFinishDatetime>20140616042200</serviceFinishDatetime>
  <facilityIdentifier>G02780-A</facilityIdentifier>
  <facilityTypeCode>26</facilityTypeCode>
  <authorIdentifier>100901</authorIdentifier>
  <authorClinicalRoleCode>ICP</authorClinicalRoleCode>
  <approverIdentifier>17AHVX</approverIdentifier>
  <creationDatetime>20140616030500</creationDatetime>
  <repositoryIdentifier>2.16.840.1.113883.2.18.35.7</repositoryIdentifier>
  <documentIdentifier>2.16.840.1.113883.2.18.7.21.7.631922867129169</documentIdentifier>

  <documentURI>https://acs.stjohn.org.nz/67ZXCVBNM9</documentURI>
  <documentTypeCode>74207-2</documentTypeCode>
  <availabilityStatusCode>A</availabilityStatusCode>
  <confidentialityCode>N</confidentialityCode>
  <languageCode>en-NZ</languageCode>
  <mediaTypeCode>application/xml</mediaTypeCode>
  <documentFormatCode>2.16.840.1.113883.2.18.7.21.7</documentFormatCode >

</entry>
</clinicalDocumentFeed>

```

<!-- Actual NHI number -->
 <!-- Date/time of call -->
 <!-- End time -->
 <!-- St John HPI Org Id -->

 <!-- ePRF Author's Staff Id -->
 <!-- Authority to practice -->
 <!-- St John Medical director -->
 <!-- Date/time of call -->

 <!-- ACS access code converted to decimal -->
 <!-- ACS access code -->

4.1.4 HTTPS Warning Response

The ACS Web Service responds as follows:

HTTP/1.1 206 Partial Content

Content-type = application/xml

Content-location /acs.stjohn.org.nz

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<clinicalDocumentFeed>
```

```
<request>
```

```
<NHI>ABC1235</NHI>
```

```
<!-- Requested NHI number -->
```

```
<user>SALLY</user>
```

```
<!-- Requesting user's identifier in CWS -->
```

```
</request>
```

```
<response>
```

```
<statusDescription>List may be incomplete as NHI alias information is not available</statusDescription>
```

```
</response>
```

```
<entry>
```

```
...as in 4.1.3 (HTTPS Successful Response)
```

```
</entry>
```

```
</clinicalDocumentFeed>
```

4.1.5 HTTPS Error Response

The ACS Web Service responds as follows:

HTTP/1.1 400 Bad Request

Content-type = application/xml

Content-location /acs.stjohn.org.nz

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<clinicalDocumentFeed>
```

```
  <request>
```

```
    <NHI>ABC1235</NHI>
```

```
<!-- Requested NHI number -->
```

```
    <user>SALLY</user>
```

```
<!-- Requesting user's identifier in CWS -->
```

```
  </request>
```

```
  <response>
```

```
    <statusDescription>Request rejected due to message validation failure</statusDescription>
```

```
  </response>
```

```
</clinicalDocumentFeed>
```

4.2 View an ACS - Example Call and Response

4.2.1 Scenario

(...this continues from 4.1.1 Scenario)

Sally reads the list of Ambulance Care Summaries on her CWS. She is interested to see that Bob was also seen for asthma the previous day, so requests the ACS from that incident.

4.2.2 HTTPS Request

To retrieve the ACS in PDF format Sunshine CWS makes the following request:

```
GET https://cws.eacc.org.nz/acs?handoverPIN=EBC4BB7E6C&format=PDF
HTTP/1.1
Content-type = application/xml
Accept = application/xml
Authorization: Basic V1NIRUQ6bGtqaDA5ODc6U0FMTFk=4
```

⁴ see 4.3 Convert Credential to Base64

4.2.3 HTTPS Successful Response

The ACS Web Service responds as follows to a request for the document in PDF format:

HTTP/1.1 **200 OK**

MIME-Version: 1.0

Content-type = application/pdf

Content-location /acs.stjohn.org.nz/**EBC4BB7E6C**

Content-ID: <2.16.840.1.113883.2.18.7.21.7.**1453821363387010**>

Content-Transfer-Encoding: BASE64

<!-- ACS access code converted to decimal -->

... Base64 encoded version of the PDF Ambulance Care Summary

4.2.4 HTTPS Error Response

The ACS Web Service responds as follows:

HTTP/1.1 404 Not Found

Content-type = application/xml

Content-location /acs.stjohn.org.nz/**EBC4BB7E6C**

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

<clinicalDocumentFeed>

<request>

<user>**SALLY**</user>

</request>

<response>

<statusDescription>Requested Ambulance Care Summary not found</statusDescription>

</response>

</clinicalDocumentFeed>

<!-- Requesting user's identifier in CWS -->

4.3 Convert Credential to Base64

1. Build the input string by concatenating operator identifier, operator password and user identifier with a colon between them; e.g. if operator identifier is "SSHED", password is "lkjh0987" and user identifier is "SALLY" then the input string is SSHED:lkjh0987:SALLY
2. Determine the ASCII values of each character in the input string and interpret them in 24-bit sequences; i.e. in groups of three 8-bit characters; e.g.

S								S								H							
83								83								72							
0	1	0	1	0	0	1	1	0	1	0	1	0	0	1	1	0	1	0	0	1	0	0	0

E								D								:							
69								68								58							
0	1	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	0	1	1	1	0	1	0

l								k								j							
108								107								106							
0	1	1	0	1	1	0	0	0	1	1	0	1	0	1	1	0	1	1	0	1	0	1	0

h								0								9							
104								48								57							
0	1	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	0	0	1

8								7								:							
56								55								58							
0	0	1	1	1	0	0	0	0	0	1	1	0	1	1	1	0	0	1	1	1	0	1	0

S								A								L							
83								65								76							
0	1	0	1	0	0	1	1	0	1	0	0	0	0	0	1	0	1	0	0	1	1	0	0

L								Y															
76								89															
0	1	0	0	1	1	0	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0

If the last sequence of 24 bits does not comprise three characters then pad with binary zeroes (as in the example above, where the last sequence only consists of two characters)

3. Break the 24 bit sequences into groups of six bits; e.g.

S						S						H											
83						83						72											
0	1	0	1	0	0	1	1	0	1	0	1	0	0	1	1	0	1	0	0	1	0	0	0
20						53						13						8					

E						D						:											
69						68						58											
0	1	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	0	1	1	1	0	1	0
17						20						16						58					

l						k						j											
108						107						106											
0	1	1	0	1	1	0	0	0	1	1	0	1	0	1	1	0	1	1	0	1	0	1	0
27						6						45						42					

h						o						9											
104						48						57											
0	1	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	0	0	1
26						3						0						57					

8						7						:											
56						55						58											
0	0	1	1	1	0	0	0	0	0	1	1	0	1	1	1	0	0	1	1	1	0	1	0
14						3						28						58					

S						A						L											
83						65						76											
0	1	0	1	0	0	1	1	0	1	0	0	0	0	0	1	0	1	0	0	1	1	0	0
20						52						5						12					

L						Y						Pad Character											
76						89																	
0	1	0	0	1	1	0	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0
19						5						36						Pad Character					

4. Determine the code associated with each six-bit group in the following translation table. If the final sequence of 24 bits consisted of two characters (as in the example above) then the last six-bit group translates to the pad character. If it consisted of just one character (i.e. the last two places were empty) then both of the last two six-bit groups translate to the pad character.

Six-bit group	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Code	A	B	C	D	E	F	G	H	I	J	K	L	M	N

Six-bit group	14	15	16	17	18	19	20	20	22	23	24	25	26	27
Code	O	P	Q	R	S	T	U	V	W	X	Y	Z	a	b

Six-bit group	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Code	c	d	e	f	g	h	i	j	k	l	m	n	o	p

Six-bit group	42	43	44	45	46	47	48	49	50	51	52	53	54	55
Code	q	r	s	t	u	v	w	x	y	z	0	1	2	3

Six-bit group	56	57	58	59	60	61	62	63	Pad Character					
Code	4	5	6	7	8	9	+	/	=					

S						S						H											
83						83						72											
0	1	0	1	0	0	1	1	0	1	0	1	0	0	1	1	0	1	0	0	1	0	0	0
20						53						13											
V						1						N											

E						D						:											
69						68						58											
0	1	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	0	1	1	1	0	1	0
17						20						16											
R						U						Q											

l						k						j											
108						107						106											
0	1	1	0	1	1	0	0	0	1	1	0	1	0	1	1	0	1	1	0	1	0	1	0
27						6						45											
b						G						t											

h						0						9											
104						48						57											
0	1	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	0	0	1

26	3	0	57
a	D	A	5

8	7	:
56	55	58
0 0 1 1 1 0	0 0 0 0 1 1	0 1 1 1 0 0
14	3	28
O	D	c
		1 1 1 0 1 0
		58
		6

S	A	L
83	65	76
0 1 0 1 0 0	1 1 0 1 0 0	0 0 0 1 0 1
20	52	5
U	0	F
		0 0 1 1 0 0
		12
		M

L	Y	
76	89	
0 1 0 0 1 1	0 0 0 1 0 1	1 0 0 1 0 0
19	5	36
T	F	k
		0 0 0 0 0 0
		Pad Character
		=

So our user credential "SSHED:lkjh0987:SALLY" translates to "V1NIRUQ6bGtqaDA5ODc6U0FMTFk="