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## **Endpoint Location Service**

### **Requirements**

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# Document information

## Change history

Version	Date	Comments
1.0 draft	2008-09-01	Draft for review
1.1	2008-12-01	Final
1.2	2009-06-30	Renamed as ELS - Final

# 1 Introduction

## 1.1 Background

NEHTA national E-Health Infrastructure has identified the need for an Endpoint location service (ELS). An ELS is a directory allowing service instances (i.e. deployed service implementations) to be located.

## 1.2 Purpose

This document lists requirements for the Endpoint Location Service.

## 1.3 Scope

This document deals with the requirements on the Endpoint location service. It does not deal with the applications that use it or the business drivers for them.

This document is intended for:

- Business analysts; and
- Enterprise and solution architects.

## 1.4 Definitions, acronyms, abbreviations

HPI	Healthcare Provider Identifier
HPII	Healthcare Provider Identifier for Individuals
HPIO	Healthcare Provider Identifier for Organisations
NEHI	National E-Health Infrastructure
NEHTA	National E-Health Transition Authority
NASH	National Authentication Service for Health
Service Provider	An organisation that hosts a technical service, primarily a Web service, on behalf of a HPIO. It may be a healthcare provider organisation or a third party proxy organisation.
TLS	Transport Layer Security
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
WSDL	Web Services Description Language
WSS	Web Services Security

## 1.5 Overview

Requirements are divided into sections based on the perspectives of the Interoperability Framework [NIF2007].

## 1.6 Terminology

The keywords **MUST**, **MUST NOT**, **SHOULD**, **SHOULD NOT**, and **MAY** in this document are to be interpreted as described in IETF's *RFC2119: Keywords for use in RFCs to Indicate Requirement Levels* [RFC2119].

## 2 Endpoint Location Service

### 2.1 Summary of Purpose

Endpoint Location Service (ELS) is a kind of directory for technical (electronic) services which are offered by healthcare organisations. It allows any client in the e-health community to discover a service interface and bind at run time.

An ELS enables exchange of messages (e.g. clinical documents) from a producer to an intended recipient, even if the producer has no prior knowledge of how the recipient handles such a transfer. For example, a hospital may need to send a patient discharge summary to a clinic where the patient would be receiving further treatment. The clinic would have a record in its ELS containing enough information for the hospital to make the discharge summary available. *ELS entries are therefore maintained according to the perspective of document recipients.*

An ELS is implemented as a Web service. An ELS lookup operation returns a set of structures containing Web service endpoints (locations) of document transfer services.

Different modes are defined to perform transfers, such as deliver (upload) and retrieve (download). In some cases a Web service may be hosted by a third party, so a notification may have to be sent prior to the document itself. Consequently, the structure returned by the ELS lookup contains information on how to use the transfer services.

Each healthcare provider organisation should have one associated ELS. However, it is possible for multiple healthcare providers to share an ELS instance. If desired, one ELS instance could function as standalone central service or as a large regional service. Alternatively, an instance could be part of a fully distributed ELS environment, associated with a few healthcare organisations, or just one.

Use of ELS services is not necessary if two parties already understand how to exchange documents. If a document provider had previously looked up a recipient's ELS, there would be no need to perform an additional lookup for a subsequent transfer. Once an ELS record has been downloaded, it may be reused indefinitely, or until permanent failure. As a convenience to clients, there is an ELS operation allowing for validity checking of previously obtained records.

### 2.2 Requirements

#### 2.2.1 Informational Perspective

Informational requirements relate to the data that is stored and returned by an ELS instance (implementation). Design of ELS interfaces are most affected by these requirements.

IR.01	ELS MUST include a lookup operation to discover service endpoints.	The primary reason for the existence of ELS. Without a standard mechanism to locate document transfer services, ad-hoc procedures would be devised, which would likely lead to restrictions and inconsistencies.
IR.02	Each HPIO MUST be associated with only one ELS instance.	Ensures that an ELS lookup service offered by any healthcare organisation is available to all healthcare providers. There is a 1:n relationship of ELS:HPIO.
IR.03	ELS lookup MUST include	Allows for the various supported

	support for all document exchange interaction patterns as referenced by [CPIS2008].	interaction modes to accomplish document exchange.
IR.04	Interaction patterns MUST be searchable based on service category.	Allows for searches to be narrowed based on the kind of clinical document to be transferred, e.g. discharge summaries, pathology reports.
IR.05	ELS lookup information MUST match service endpoints with service roles described by interaction patterns.	Relates IR.01 to IR.03. It states that there must be a way to match a service with the correct interaction role. This is especially a consideration when the interaction pattern supports more than one role, e.g. deliver and notify.
IR.06	ELS lookup information MUST include service provider identification.	To ensure that that service provider information is known. Service provider may be different to the healthcare provider, e.g. because the service is hosted on behalf of the healthcare provider. Currently a standard identification mechanism for non-healthcare service providers is yet to be defined. However, it is deemed necessary that ELS contains information to identify them somehow.
IR.07	ELS lookup information MUST include service provider interface.	To ensure that clients can use a discovered service. In the short term, WSDL interface references will be the norm. In the longer term, non-Web service interfaces may be feasible.
IR.08	ELS lookup information MUST include information to support secure message exchange through a Web service as per [CPIS2008].	There must at least be a placeholder for certificates to use with the associated service. In the absence of a NASH service there is no standard way for clients to obtain the certificate to use to encrypt a session key. AN ELS can provide for this capability in the short term.
IR.09	ELS lookup information MUST include at least one reference to an X.509 certificate for the purpose of securing communications through an associated service.	Relates to IR.06. It states that the certificate to use with the associated service (whose public key component will be used to encrypt a session key: see [XSP2008]) must be present. It may be that a service provider is associated with more than one certificate, e.g. one for each DNS host name. In that case, the appropriate certificate reference would be required from the ELS.
IR.10	ELS MUST have an operation to determine if a given interaction pattern and associated service(s) is valid.	Relates to business requirements BR.11 and BR.12. Essentially, these support the ability to cache information returned by an ELS. When a service failure occurs there must be an operation to determine whether the relevant endpoint is still supported. If it is not, the client will have to perform an ELS lookup to discover the current endpoint (assuming the interaction is still supported). If the endpoint is valid, the problem will most likely be resolved in the near future and another invocation should then succeed.

## 2.2.2 Business Perspective

Business requirements relate to how the system can or will be used in deployment scenarios. They are mostly functional caveats with which design of the interface and realised instances must be compatible.

BR.01	Any ELS <b>MUST</b> be searchable by any healthcare provider in the e-health community.	Business analogue of IR.01, the primary reason for ELS.
BR.02	AN ELS implementation <b>MUST</b> be capable of being associated with multiple HPIOs.	States that there can be multiple HPIOs associated with a single ELS, i.e. the relationship between ELS and HPI is one to many. See also IR.02.
BR.03	ELS <b>MUST</b> encompass a standard lookup interface.	Provides for consistency of search operations. It allows conformant client code to be reused.
BR.04	ELS <b>MUST</b> encompass a standard update interface to add document exchange interactions and associated service endpoints.	BR.04 and BR.05 provide for consistency of those update operations that allow healthcare providers to modify their own records. They are particularly important when the ELS implementation is hosted by a third party.
BR.05	ELS <b>MUST</b> encompass a standard update interface to remove document exchange interactions and associated service endpoints.	
BR.06	A HPIO entity associated with an ELS <b>MUST</b> be able to create records pertaining to its supported document exchange interactions.	BR.06 and BR.08 state that an ELS implementation must allow a healthcare provider to update the services it hosts or which are hosted on its behalf. To accomplish that, healthcare providers can use standard interfaces required by BR.04 and BR.05.
BR.07	ELS <b>MUST</b> be able to return alternative services for the same HPIO and document category.	
BR.08	A HPIO entity associated with an ELS <b>MUST</b> be able to remove records pertaining to its supported document exchange interactions.	Allows for more than one implementation of the same kind of service, i.e. same interaction pattern and document category. If a healthcare provider outsources a service and later decides to outsource to a different implementer or host the service in-house, there may be a transition period where both services are supported. Also, two third party organisations may compete for service invocations. One organisation may be preferred by client <i>A</i> and the other by client <i>B</i> . ELS design should not force providers into restrictive business practices.
BR.09	Existing implementations with ELS-like functionality <b>MUST</b> be able to co-exist with ELS.	Allows for the continuation of current organisational practice. Although IR.02 allows for a HPI to be associated with only one ELS, current service directories are not actually standard ELSs. Information maintained by such services regarding

		HPI offered services must be reflected in the appropriate ELS. To accomplish this, it is anticipated that standard update facilities required by BR.04 and BR.05 can be used.
BR.10	ELS implementations MUST be able to be hosted on behalf of healthcare providers by third-party organisations.	Many healthcare providers will lack the technical resources to host the ELS with which they are associated. This requirement exists to specifically accept the out-sourcing of ELS implementations.
BR.11	ELS Clients SHOULD be able to cache information returned from a lookup operation.	It is assumed that clients will locally store information returned by an ELS lookup, to be reused when another document is to be transferred. This amounts to caching of remote references. There is no requirement for explicit timestamps since these values are necessarily fuzzy and lead to increased maintenance. When the information obtained by some prior ELS lookup can no longer be relied on, a failure will occur. Assuming the failure is because the service is no longer active (see IR.10) another ELS lookup is necessary.
BR.12	It MUST NOT be necessary to lookup an ELS prior to every attempt at document transfer.	Corollary of BR.11. If values can be cached it should not be necessary to always reaffirm those values. In any case, as with most directory-like services, the information is expected to be relatively static.
BR.13	ELS MUST support references to UHI/NASH certificates.	Requires that the design of ELS interfaces is sufficiently flexible to adopt references to future certificates issued by supported CAs.

### 2.2.2.1 Deployment Model

As can be inferred from the requirements above, in particular BR.02, it will be possible to deploy an ELS as a centralised service maintaining endpoints for every HPIO. At the other extreme it is also possible to deploy one ELS for each HPIO.

In the long term, it is anticipated that ELS instances will be deployed by third party organisations on behalf of healthcare providers. Both central and distributed models are permitted by the requirements.

## 2.2.3 Technical Perspective

Technical requirements include technology choices and performance metrics and security requirements.

TR.01	ELS MUST be implemented as Web services as per [WSP2009].	In keeping with the NEHTA ethos. ELS services can be invoked cross platform and programming language.
TR.02	ELS implementations MUST NOT be dependent on the NASH specification.	It must be possible for ELS implementations to be developed before the NASH service is available. The primary problem will be that trust

relationships cannot be standardised. Until the NASH is realised, it is anticipated that healthcare providers may use Medicare Australia PKI or perhaps temporary certificate issued by NEHTA.

**TR.03** ELS implementations MUST NOT be dependent on the UHI specification.

It must be possible to construct ELS instances while work on the UHI continues. It is anticipated that the HPIO record will contain an attribute to resolve the ELS endpoint. Until this service is a reality, ELS endpoints will have to be "well-known", obtained via a special purpose, master ELS, published on a Web site, etc.

**TR.04** ELS request and response messages MUST be conform to either the TLS or WSS profile as specified by [WSP2009].

Incoming and outgoing messages are protected so as to ensure authentication, message integrity, and confidentiality.

#### 2.2.3.1 Performance Metrics

At the time of writing no performance metrics have been identified.

# Appendix A: References

- [CPIS2008] NEHTA, *Concepts and Patterns for Implementing Services, V2.0*, 1 December 2008.
- [NIF2007] NEHTA, *Interoperability Framework v2.0*, 17 August 2007.
- [WSP2009] NEHTA, *Web Services Profile v3.1*, 17 June 2009.
- [XSPP2008] NEHTA, *XML Secured Payload Profile v1.0*, 1 December 2008.