Broadbanding
Australia

B2B Gateway Architecture
TECHNICAL SPECIFICATION

MAY 2011

NBNCo
Limited

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Environment

NBN Co asks that you consider the environment before printing this Specification.

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1 About this document

Who is it for?	This document is intended to be used by Access Seeker Solution Architects and Development Teams. It is also intended to be used by NBN Co vendors of the Integration & Core Flow domain to aid the design and development of the Business to Business (B2B) Gateway.
Pre-Requisite Knowledge	The reader is assumed to have good understanding of the following technologies: Internet Technologies SOA patterns and designs ebXML Framework
Purpose	This document details the concepts, technical specifications and architecture proposed for the B2B Gateway to be provided by NBN Co. It is intended to aid integration planning and on-boarding.
In scope	The contents of this document represent NBN Co's current position on the subject matter.
Out of scope	
Important Note	This specification reflects input received from extensive industry consultation, including NBN Co sessions with the Communications Alliance, and a number of technical 'deep dives' with Access Seekers. The content of this document represents NBN Co's current position on the subject matter and should not be relied upon as representing NBN Co's final position on the subject matter of this document, except where stated otherwise. The views expressed by NBN Co in this document may change.

1.1 Related Documents

Document Number	Document Title	Owner/Link	Date of Issue	Version Number
1.	B2B Interaction Business Processes Technical Specification	NBN Co	2/05/2011	V1.0
2.	NBN Product Definition Technical Specification	NBN Co	2/05/2011	V1.0
3.	Business Process Specification Schema v1.01	http://www.ebxml.org/specs/ebBPSS.pdf	11/05/2001	V1.01
4.	Collaboration-Protocol Profile and Agreement Specification v2.0	http://www.ebxml.org/specs/ebcpp-2.0.pdf	23/09/2002	V2.0
5.	Message Service Specification v2.0	http://www.ebxml.org/specs/ebMS2.pdf	1/04/2003	V2.0
6.	International standards ITU M.334x	http://www.itu.int/rec/T-REC-M.3340-200905-I	May 2009	05/2009

2 Overview

NBN Co will provide Access Seekers with highly-automated mechanisms to interact with it for the purposes Fulfilment, Assurance and Billing via the NBN Co ebXML Gateway (B2B Gateway). NBN Co has worked in conjunction with Access Seekers through Communications Alliance to develop the necessary requirements for interactions between buyer and seller, in line with international standards such as the ITU M.334x and standards stemming from bodies such as the UK interoperability standards group, Network Interoperability Consultative Committee (NICC).

This document describes the following:

- The roles and functional elements that underpin the envisaged B2B Gateway communications.

- The various layers within the communications model between organisations.

- Relevant aspects of the ebXML specifications, and their application within the NBN Co context in communicating with Access Seekers.

- Some considerations that Access Seekers should make when selecting software implementations and suggestions on how to integrate them into their existing IT systems landscape. These considerations and suggestions are provided for information only, and all decisions on software selection and integration remain the sole responsibility of Access Seekers.

- The way in which ebXML Collaboration Partnership Agreements (CPAs) specify accessible services, and how these CPAs may evolve over time.

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B2B Gateway Technical Specification

3 Objectives

3.1 In-Scope

The following is considered to be in scope for this document.

- Define the connectivity mechanism of the NBN Co B2B GGateway.
- Explain the standards used for:
  - Providing appropriately reliable, secure and non-repudiable messaging
  - Sharing/communicating parameters relevant to messaging
  - Sharing/communicating Services, Operations and Data Contracts available for use
  - Provides business collaborations supported by the interface.
- Outline Access Seeker integration guidelines and recommendations.
- Identify lifecycle management of product, process and touch points.
- Provide a sample scenario of Access Seeker interactions supported via the B2B Gateway.

3.2 Out of Scope

The following is considered to be out of scope for this document.

- Operational contract or Access Seeker onboarding processes and procedures.
- Guidelines and modes of operation for internal work instructions required by Access Seekers when dealing with NBN Co.
- Further details of functionality specific to the Access Seeker Service Portal functionality; the Service Portal is to provide similar functionality but support human-machine interfacing rather than machine-to-machine interfaces.

3.3 Statements

The following statements clarify aspects relating to the objectives and use of this document.

This document does not prescribe the final set of transactions to be supported by the B2B Gateway. The B2B Interaction Business Processes Technical Specification document will define the supported B2B scenarios and transactions.

While updates to transactions and scenarios are likely with new products being introduced, the B2B architecture will be resilient to such changes.

Transaction response times will be defined in the B2B Interaction Business Processes Technical Specification.

Business Process SLA, defined milestones, and any miscellaneous charges will be defined and managed under the Wholesale Broadband Agreement.

4 Technical Architecture

4.1 B2B Gateway Aims

NBN Co will provide a B2B Gateway to facilitate interactions with Access Seeker systems. It will cover Fulfilment, Assurance and Billing functions of NBN Fibre Access Service (NFAS), NBN Wireless Access Service (NWAS) and NBN Satellite Access Service (NSAS) products.

The key aims for NBN Co's B2B strategy are as follows:

- Allow Access Seekers to control provisioning and assurance of network resources used by them in a way that is as close as practicable to being as if the resources were their own

- Allow fast and cost effective Access Seeker integration using open standards

- Reduce overall total cost of ownership of B2B systems with architectural designs that are resilient to lifecycle changes such as new product/process introductions.

4.2 NBN High Level Architecture

NBN Co's B2B architecture is based on a messaging model in which Buyers and Sellers interact via an exchange of business messages. NBN Co will use the electronic business eXtensible Markup Language (ebXML) framework as the standard for message exchange. ebXML is an open, non-proprietary, industry standard platform facilitated by the OASIS group.
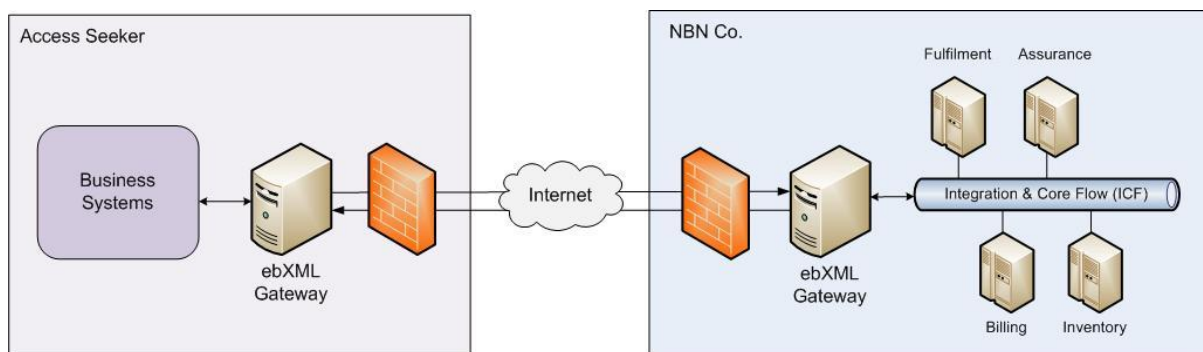
Figure 1 High Level Architecture

B2B transactions involve the sending and receiving of messages between two messaging Gateways, called ebXML Gateways, as shown in Figure 1.

Access Seekers will need to host an ebXML Gateway to send and receive messages to/from NBN Co. Application integration is then between the Access Seeker's business systems and the Access Seeker's ebXML Gateway.

4.3 B2B Terminology

NBN Co will expose Business Services via the NBN B2B ebXML Gateway. These Business Services are comprised of *actions* which the Access Seeker can invoke to perform a business function. An end to end business process interaction can be achieved by invoking one or more actions.

ebXML defines two types of actions: a send action in which a party can send a message to another party, and a receive action in which a party can accept a message from another party. A *message* can then be defined as the XML document exchanged between two actions – a send and a receive action.

For the purposes of clarity, the table below shows the terminology relationship between ebXML and Web Services.

NBN Co.	ebXML	Web Services
Business Process	Business Process (BPSS)	-
Business Service	Service	Service
n/a	n/a	Operation
Touch point	(Can Send) Action	Request
Touch point	(Can Receive) Action	Response

Table 1 B2B Terminology

The relationship between ebXML Actions and messages is one-to-one, such that each action relates to a single message.
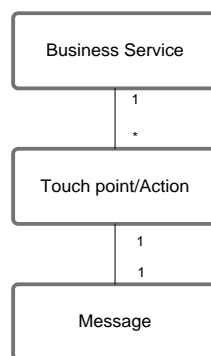

Figure 2 B2B Terminology Entity Relationships

An example of terminology usage by NBN Co is illustrated in Table 2. Note, the ebXML Action is defined in terms of the Access Seeker capability.

Business Process	Business Service (ebXML Service)	Touch point (ebXML Action)
OH-BP001 Request Connect Order	Manage Product Order	submitOrderConnect (canSend)
		notifyOrderAcknowledged (canReceive)
		NotifyOrderAccepted (canReceive)
		notifyOrderCompleted (canReceive)

Table 2 NBN's B2B Terminology Example[1]

4.4 Key Functionality of the B2B Gateway

The B2B Gateway will enable the Access Seeker to engage in a comprehensive range of business interactions relating to Fulfilment, Assurance, and Billing.

The Fulfilment processes includes actions to determine the serviceability of a location, the feasibility of service production to that location, to place an order, to enrich orders with information such as appointment details, to modify in flight orders etc. The Assurance process includes the ability to perform service tests and diagnostics, to place a trouble ticket, to update a trouble ticket and to accept trouble ticket resolution etc. Refer to the NBN Co B2B Interaction Business Processes Technical Specification for the definition of all business processes supported by the B2B Gateway.

4.4.1   B2B Message Exchange Patterns

The UN Modelling Methodology (UMM) provides a framework for generic interaction patterns that can be used to simplify the understanding of types of operations. This framework can be used by the Access Seeker to better understand how the operations should be used, and the integration requirements of the operation types.

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[1] Table 2 is provided for illustrative purposes only and does not describe the complete set of touch points for the given business process, Some touch points have been omitted for brevity.

UMM Interaction Pattern	NBN Message Pattern	Description
Commercial Transaction	Submit/Notify	A multi-message pattern for long running processes within NBN. A single initial 'submit' message invokes the long running process, and is thereafter followed by one or more notification messages. This pattern is used for commercial transactions and consequently messages are considered to be non-repudiable and idempotent (re-submission is safe; NBN Co will not action identical submission).
Notification	Notification	A one-way message pattern for event driven processes. Used for unsolicited transactions that does not require a corresponding initiating / or responding transaction.
Request-Response	Request/Response	A two-way message pattern for short running processes where responses are delivered in near real time. Used for transactions that may alter state of an object (that is, read/write operation), consequently messages are idempotent (re-request is safe; NBN Co will not action identical requests).
Query-Response	Query/Response	A two-way message pattern for short running processes where responses are delivered in near real time. Used for transactions that cannot alter state of an object (that is, read only operation), for example a database lookup.
[Request-Confirm]	Not Used	Supports near real-time business transactions that are stateless.

Table 3 – Support for UMM Interaction Patterns

A 'requestSingleSiteQualification' action is available via the B2B Gateway for Access Seeker to request a service qualification for an end user. This action will be performed in near real-time by the B2B Gateway, and the response will include the qualification results. It is an example of a stateless Request-Response action.

In contrast, Submit/Notify transactions are state-full, and involve long running business process. To place an Order, the Access Seeker would invoke the 'requestOrderConnect' operation within the 'Manage Order' business service. It triggers a long running business process at NBN Co that would kick off order validation and serviceability checks. If validation/serviceability checks pass, an acceptance notification will be sent for the Access Seeker's 'requestOrderConnect' and the business process will continue with fulfilment activities. The order lifecycle continues beyond the initial acceptance, and the Order Id can be used in conjunction with other Request-Response and Query-Response operations.

During the further processing of the order, NBN Co will provide a notification to the Access Seeker as the order progresses or if more information is required to complete the order. This Notification pattern is asynchronous). Here, the Access Seeker's B2B Gateway acts as a Server.

4.4.2   Asynchronous Messaging

All messaging via the NBN B2B Gateway are asynchronous. While notification operations are always asynchronous and unsolicited, a response received to a request or query operation is solicited but still asynchronous in the messaging layer. This is due to the asynchronous delivery of messages in the B2B Gateway.

However, an operation with short SLA times for a response can be treated as a synchronous 'operation' by the Access Seeker's business application, if they wish to do so. That is, the Access Seeker's business application can invoke a synchronous call to the Access Seeker's ebXML Gateway Message Service Interface (internal interface). This is independent of the Access Seeker's ebXML Gateway asynchronous messaging to NBN's Gateway (external interface).

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4.5 B2B Gateway Architecture

The NBN Co B2B Gateway will be designed and built using the electronic business eXtensible Markup Language (ebXML) framework. The ebXML is an open standards framework used to construct B2B functionality. Access Seekers that wish to integrate are required to design and implement an ebXML compliant Gateway to communicate with NBN Co.

The remainder of this document will specify how the ebXML framework is applied in the design and construction of the NBN B2B Gateway. It is imperative that Access Seekers understand the proposed use of the various ebXML framework components by NBN Co prior to implementation planning.

It is also important to highlight that, as a result of ebXML adoption, the B2B Gateway will vary from classic WS-* implementations where web services are exposed by the provider (NBN Co) to be consumed by the buyer (Access Seeker). For WS-* implementations to support notifications and asynchronous processing, the Access Seeker would be required to setup WS-* end points that NBN Co can connect as a client.

Each ebXML framework component includes a detailed specification that explains how the component is to be used and the inter-relationship with other ebXML components. The following table summarises the ebXML components that are used by the B2B Gateway

Solution Space	ebXML Component	Specification
Messaging	ebXML Message Specification and Message Service Handler	ebMS 2.0
Service Publication	CPA (Collaboration Protocol Agreement) – detailing service bindings and messaging parameters	ebCPP 2.0
Product/Process Publication	Business Process Schema – detailing process supported	ebBPSS 2.0
	Core Components – framework for business documents	ebCCTS1.9

Table 4 – ebXML Component Summary

The ebXML Messaging Specification (ebMS) forms the foundation of the B2B Gateway. It specifies how discrete messages can be passed between NBN Co and the Access Seeker. A message is a uni-directional collection of data that can be sent by NBN Co or the Access Seeker. ebMS helps establish a messaging engine between NBN Co and Access Seeker that enables the asynchronous delivery of messages (notifications and responses) discussed earlier. The client/service relationship will vary based on the direction of message travel. This result in a dual role for the ebXML Gateway pictured below. The Access Seeker's ebXML Gateway acts as a client when sending messages and acts as a server when receiving a message.
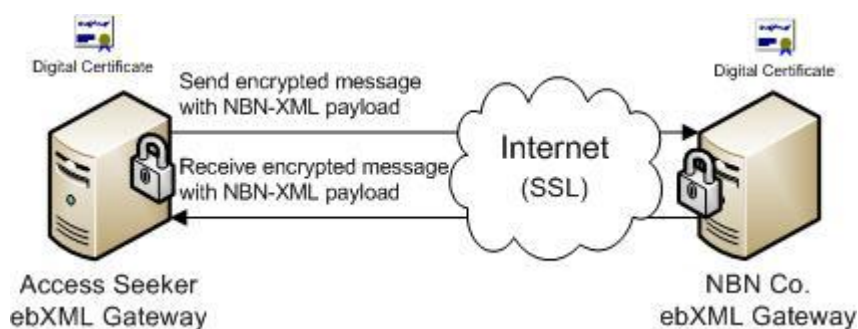
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Figure 3 – Architecture Components

Access Seekers looking to setup an ebXML Gateways, should first address ebMS requirements. In conformance with the ebXML architecture, the NBN B2B model requires that each Access Seeker hosts their own ebXML compliant Gateway server, which will send messages *to* NBN and receive messages *from* NBN. All messages travel over the Internet using SOAP/HTTP and will be encrypted using SSL and digitally signed with the Access Seeker's digital certificate. NBN Co is exploring the option of leased line interconnect between the Access Seeker's B2B Gateway and NBN Co's B2B Gateway. If feasible, the details will be provided in a future update of this document.

The ebMS specifies the software artefact required to act as the messaging platform that will satisfy the Gateway requirements. This is referred to as an ebXML Message Service Handler (MSH). Access Seekers are therefore required to implement a MSH capability. Commercial MSH implementations are available that the Access Seeker can buy and integrate to their back end systems. Commercial implementations vary from ESB adaptor to stand alone applications to suit Access Seeker needs.

With a MSH capability established, Access Seekers will gain the infrastructure required to establish the underlying communiction and messaging. (Note: the B2B Gateway itself will establish the MSH capabilities). The two MSH's will host their respective endpoints and be able to enforce authentication, digital certification security, SOAP processing of ebXML messages as out of the box capability that can be configuration driven.

The following diagram depicts the reference B2B architecture stack. Each layer is described in terms of the protocols, standards and business systems relevant to the layer. It shows how ebMS is used to establish messaging connectivity.
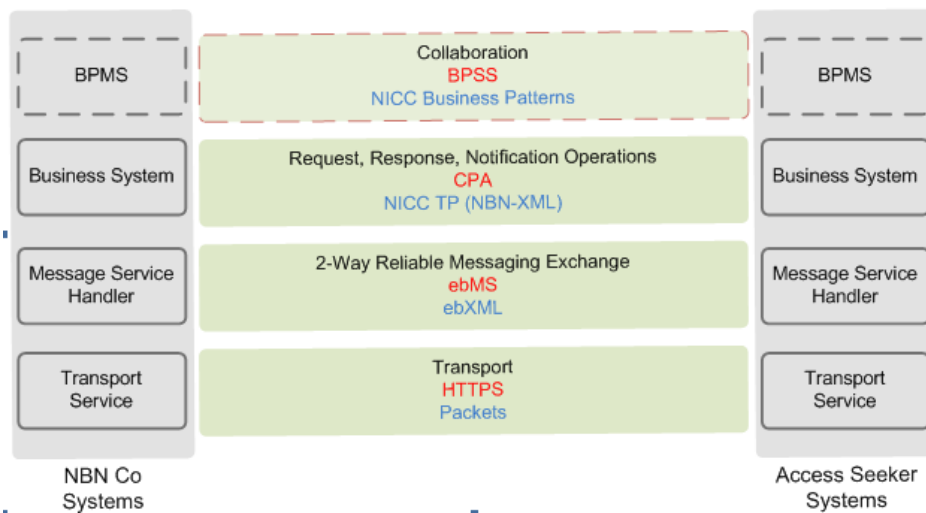

Table 5 – NBN Co B2B Architecture Stack

The layers above messaging are used to construct business operations using the discrete message passing ability of ebMS and message service handlers. The ebXML Collaboration Protocol Agreement (CPA) and ebXML Business Process Specification Schema (BPSS) ebXML components are used by the B2B Gateway for this purpose.

The CPA enables the B2B Gateway operations to be specified and implemented. A CPA is best understood as an agreement of the business services and actions supported by NBN Co's B2B Gateway. It details the request/response and notification actions discussed before. It specifies the messages passed for each service (one-way or two-way based on business process). The CPA services many purposes, and is important to be understood well in implementation planning.

The CPA allows the Access Seeker to understand the business services and actions available, and the data that is required to be sent or received as part of invoking an action. Therefore, it conveys the information required by the backend systems to integrate with the B2B Gateway. The diagram above shows the business systems sitting on top of the MSH, where it can invoke actions or receive notifications via the MSH.

The CPA also provides the programmatic means to configure a MSH to carry out the messaging. It defines the security and messaging characteristics required to implement the interaction in the messaging layer.

It is important that all B2B participants realise the relationship between interactions and asynchronous messaging, and the role played by the MSH. The MSH provides business systems with an interface to invoke actions based on a CPA. For a two-way interaction (such as request/response), the business system will invoke the interaction by passing the request message to the message service handler as an atomic action. The MSH will implement the messaging by sending the request message and registering the response when it arrives. The business system is then required to process the response as a separate process.

Therefore, the responsibility of correlating a request to a response falls with the business systems shown in the diagram above. The business system can realise an interaction with a short response SLA as a synchronous operation by waiting for the response to reach the local MSH and providing the response to the caller (similar to the behaviour of a web service). It is important to understand that this responsibility is not native to ebXML and has to be implemented by the Access Seeker.

Finally, the ebXML BPSS component is used in conjunction with the CPA. It defines the choreography of actions allowed to be used between NBN Co and Access Seekers. It explains the business services that NBN Co offers by specifying the operations that are available and allowed to be used to achieve a business outcome.

BPSS is best understood as an XML formatted document that defines the business services as described by the B2B Interaction Business Processes Technical Specification. It relates operations to logical business collaborations that are supported. While it will not describe the internal business processes required at NBN Co or with Access Seekers, it will be useful in constructing the (buying and selling) business processes. Access Seekers will not need to use a Business Process Model (BPM) tool. It remains open how the Access Seekers choose to implement their business processes.

The remaining sections of the document will explain the ebMS based messaging platform and the CPA based service and operation publication is detail.

4.5.1   Physical B2B Architecture

The B2B Gateway will be implemented using IBM's WebSphere DataPower B2B Appliance XB60. The following diagram shows where the DataPower Appliance is positioned in NBN Co's B2B architecture stack.

An illustrative example for an Access Seeker's physical architecture is also shown to highlight that there is no dependency on Access Seeker's B2B Gateway and systems implementation with NBN Co's implementation. That is, interoperability is achieved between disparate systems by virtue of ebXML being an industry standard specification.
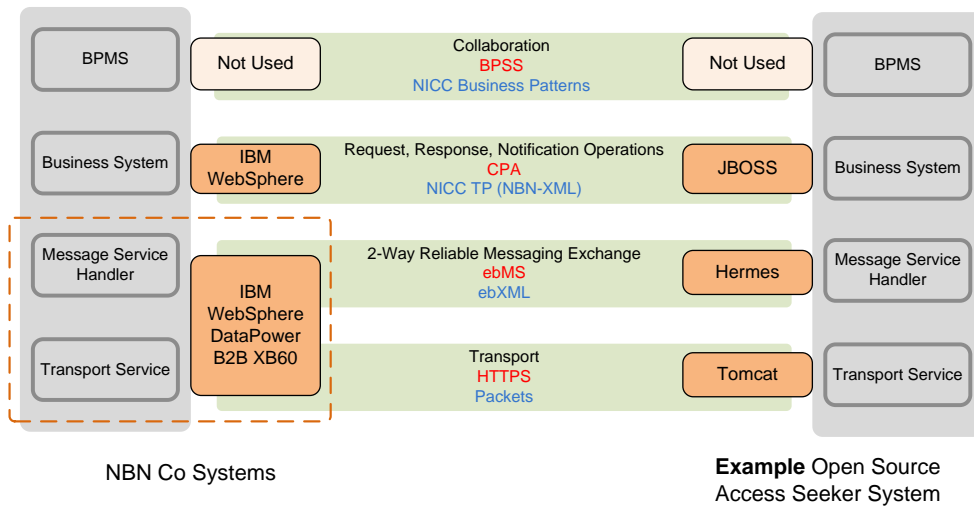
Figure 4 - NBN Co's Physical Architecture & Example Access Seeker Architecture

5 Messaging Framework

The ebXML messaging specification (ebMS) is an open standard for messaging that provides a framework for secure, reliable and non-repudiable exchange of messages between two parties. It is independent of the transport protocol and payload being used and reuses a number of existing standards and protocols.

As described earlier, a message service handler (MSH) forms a necessary component of the ebXML Gateway. This section provides an in-depth view of ebMS and MSH used to form the messaging framework.

Figure 5 – Messaging Elements

ebMS provides a collection of a modules that represent specific messaging functionality. Some modules are mandatory as they provide the core messaging capability, while others are optional, where additional features such a reliable messaging are made available. MSH are classified by the modules it support.

 Table 4 comprise the total set of modules that are supported by ebMS along with a description. The B2B Gateway will not require all modules to be supported by the MSH. The modules that are required to be supported by the Access Seeker's message service handler are indicated below.

ebMS Module	Description	Required MSH Functionality
Core Extension Elements	Specification of the structure and composition of the information required for an ebXML message service to generate or process an ebXML message.	Yes
Security Module	Specification of the security semantics for ebXML messages.	Yes
Error Handling Module	Specification of how errors detected are reported to another message service handler.	Yes
Reliable Messaging Module	Interoperable protocol where two message service handlers can reliably exchange messages using once-and-only-once delivery semantics.	Yes
Message Status Service / Message Service Handler Ping Service	Specification of a service that enables one message service handler to discover the status of another message service handler or message. Although not required for interoperability, it is required to aid systems support.	Yes
Message Order Module	Specification to guarantee that messages are received in the correct sequential order by the receiving message service handler.	No
Multi-Hop Module	Specifications to route messages through intermediate message service handlers.	No
SyncReply Module	Specification of synchronous message replies from the receiving message service handler.	No

Table 6 – ebMS Modules required for NBN Co B2B Integration

Setting up a MSH that supports the ebMS modules listed above provides the platform for integration with NBN Co. The MSH can then be used to send and receive messages as part of the B2B Gateway.

MSH also allows messages to be transferred with varying messaging levels – defined by a message profile. A message profile is constructed using a selection of ebMS modules and ebMS messaging elements. The profile used depends on the business context of the message. The Collaboration Protocol Agreement (CPA) will specify the messaging profile to be used by messages for each operation. The CPA is elaborated in *Section* 6 –*B2B Services*.

The ability to user a CPA to configure the message service handler will vary depending on the ability of the tools available to configure the MSH. This is addressed in *Section 5.2 – Access Seeker Implementation*. However, the configuration can be done manually by following a CPA document, if no automated tools are available.

5.1 Key Configuration Parameters

ebMS defines a number of messaging elements that are used by the standard to achieve messaging goals. They are contained within the message headers (soap header extensions) passed within the ebXML message. The message header elements allow the receiving message service handler to interpret the message and comply with its messaging requirements.

While detailed description of each can be found in the ebXML Messaging Specification 2.0 document, it is not essential that they all be understood by the Access Seeker. The majority of the messaging element processing is handled by the MSH, therefore, by implementing a commercial MSH, the need to understand the messaging elements are greatly reduced.

The MSH, therefore reduce the complexity of messaging elements by performing most of the processing. The detailed understanding of messaging elements is left only to the *designer* of the CPA, and the MSH takes care of the runtime execution.

Business application that integrates with the message service handler is left with a simplistic interface. Table 7 – Messaging Parameters for Business Applications - provides the information required by business applications when invoking a B2B Gateway operation, along with its payload.

	Description
CPA ID	ID of the agreement that is in place between NBN Co and the Access Seeker that governs the exchange of messages. Refer to *Section* 6 – *B2B Services* for more details on CPA. The message being sent/received must belong to this CPA ID.
Party ID (Sender/Receiver)	The ID that uniquely identifies the message sending and receiving party.
Roles (Sender/Receiver)	The role of the sending and receiving party in the context of the CPA. NBN Co will use Buyer and Seller as the two possible parties.
Service	The name of the business service that the operation being called belongs to, as specified by the CPA, for example: 'Manage Order'.
Action	The name of the operation being called as specified by the CPA, for example: 'Request Order' operation in 'Manager Order' service.

Table 7 – Messaging Parameters for Business Applications

The business system can invoke an operation by first specifying CPA Id governing the B2B agreement and the Service name and action called along with the NBN-XML payload specified for the operation on the CPA. The MSH will use this information to ascertain the message profile to use to finally transmit the ebXML message. The mapping process where the profile messaging elements get attached is shown below.
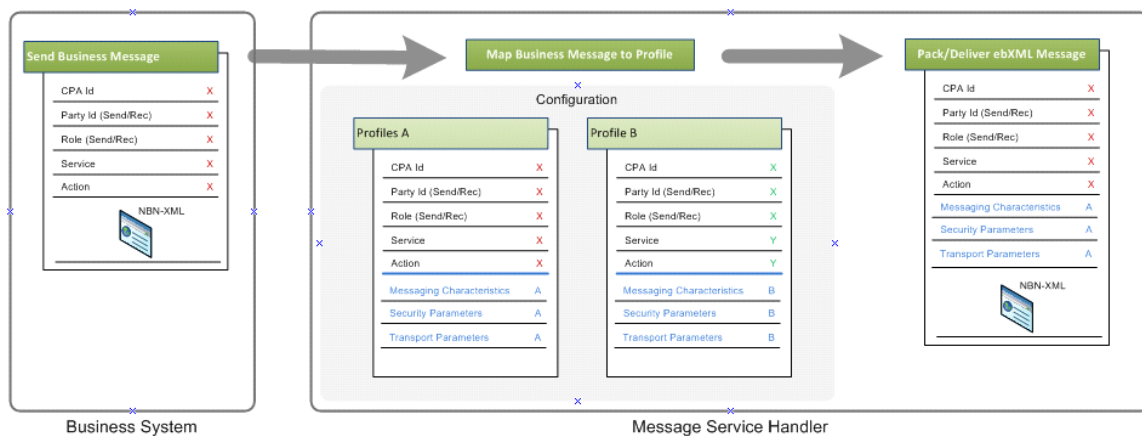
The B2B Gateway will use a number of profiles to satisfy the business scenarios. While NBN Co will aim to keep the message profiles required to a minimum to reduce MSH configuration complexity, it expects the CPA driven configuration to be adopted by majority of Access Seekers to simplify this task. CPAs are discussed further in *Section* 6 – *B2B Services*.

NBN Co intends to provide the following profiles to assist Access Seekers in configuring their B2B Gateway:

- NBN Co ebMS Deployment Profile which will be based upon the OASIS Deployment Profile Template v1.1 for ebMS version 2.0[2]

- NBN Co CPA Deployment Profile which will be based upon the OASIS Deployment Profile Template v1.1 for CPA version 2.0[3]

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[2] Refer http://docs.oasis-open.org/ebxml-iic/ebXML_DPT-v1.1-ebMS2-template-pr-01.pdf

[3] Refer http://docs.oasis-open.org/ebxml-iic/ebXML_DPT-v1.1-ebCPPA2-template-pr-01.pdf

5.2 Access Seeker Implementation Considerations

The widespread adaptation of ebXML technology has resulted in a range of MSH options becoming available in the market. These include several Commercial Off-the-Shelf (COTS) and Open Source implementations as well as MS2.0 adaptors for ESB platforms from major commercial vendors. Some important requirements to consider when choosing a Message Service Handler are outlined in the table below.

Message Service Handler Functionality	Required
Header processing and parsing	Mandatory
Support for ebMS modules for NBN (Digital signature creation and verification, Encryption, authentication and authorisation & Reliable messaging)	Mandatory
Business Application Integration	Mandatory
Drummond Group certification	Desired
Clustering and load balancing	Optional

Table 8 – MSH Requirements

As it is envisaged that Access Seeker's would use an off the shelf (either commercial or open source) product as their Message Service Handler, the only development costs the Access Seeker incurs is the integration layer between existing their internal business systems and the Message Service Handler as illustrated in Figure 5.
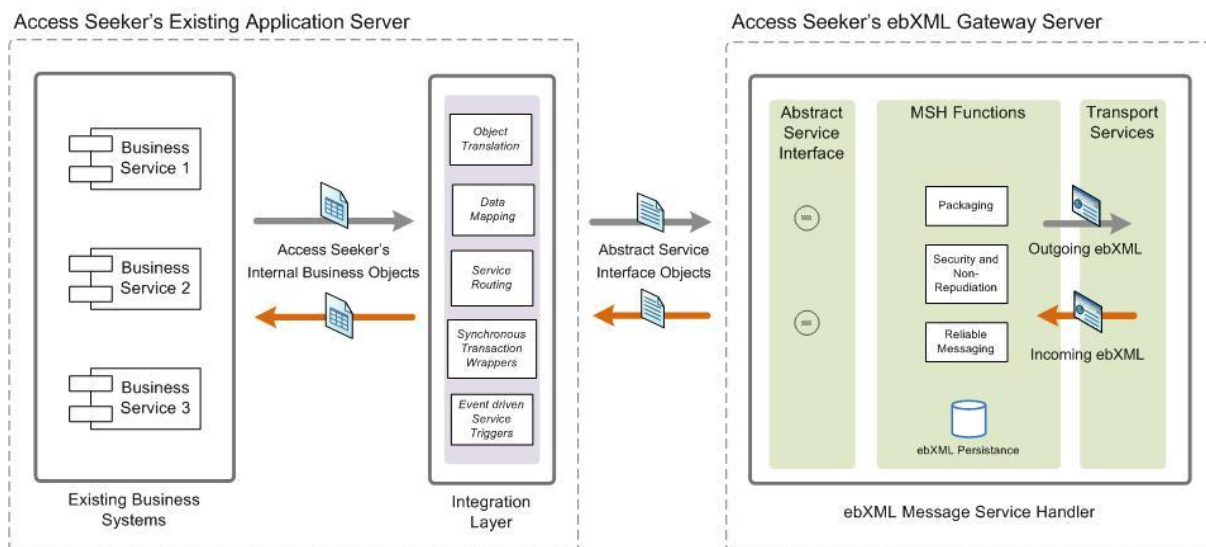
Figure 7 – Access Seeker Implementation Components

Access Seeker should carefully select a MSH that enables convenient integration options to existing business systems. The Integration point between the existing business systems and the MSH will be at the 'abstract service interface' shown above. This interface is not specified by the ebXML standard, and hence will be an important consideration when selecting a message service handler; it has to be chosen to allow the best fit with Access Seeker's internal systems.

Some implementations provide asynchronous message end points for submitting/receiving xml messages and error messages at this interface. This is more suitable for Access Seekers that wish to integrate via ESB infrastructure.

Examples of the functionality that may be considered for the integration layer are:

- Performing the translation between business objects and NBN-XML objects.

- Outbound transactions: Routing business services to the correct NBN interactions process.

- Inbound transactions: Invoking the correct business service from an NBN notification.

- Simulating synchronous requests from the business systems by creating wrappers around the asynchronous ebXML messaging transactions.

An overview of some of the MSH options available as Enterprise Integration systems, stand-alone COTS and Open Source implementation can be found here:
http://www.ebxmlforum.net/articles/ebfor_SoftwareProducts.html

Drummond group certifies ebXML products based on interoperability tests. A list of certified products can be found via the following link:
http://www.drummondgroup.com/html-v2/ebXML-companies.html

5.3 Selection Criteria

The selection of ebXML for the implementation of the B2B Gateway is based on the following reasons:

- Able to support asynchronous message delivery between Access Seekers and NBN Co.

- Able to deliver messages reliably, and allows automated retry under failure.

- Provides authentication and authorisation.

- Able to operate as a stand-alone messaging layer that is decoupled from business systems. This allows varying sophistication of Access Seeker and NBN Co systems.

- Has an open specification that is not locked down to any product, vendor or other particular implementation aspect. This maximises flexibility and re-use of existing Access Seeker infrastructure.

- Has strong industry adoption and availability of tooling to meet a wide range of Access Seeker scenarios:

- COTS and Open Source implementation available

- MS2.0 Plug-ins available with all major application vendors.

- Promotes and enables configuration driven integration. This reduces integration complexity and overhead.

Other considerations included:

- The availability of a certification body for ebXML implementations and tooling. (Drummond Group provides ebXML MS2.0 interoperability tests.)

- The existence of prior implementations for similar or related purposes, for example: the NICC facilitated marketplace within the UK and the Australian Energy Market Operator.

6 B2B Services & Operations

NBN Co will use the Collaboration Protocol Agreement (CPA) to facilitate service description, publication, binding of all services offered to Access Seekers via the B2B Gateway. The components of the Collaboration-Protocol Profile and Agreement Specification 2.0 (ebCPP) of the ebXML framework which defines the mark-up language and vocabulary for creating electronic CPA.

A CPA is an XML document that describes all valid and enforceable, interactions between two parties. The message exchanges are described in the context of services and operations offered by the B2B Gateway. That includes the transport, messaging characteristics and security constraints required for message exchanges. It also specifies the binding of the message exchange to transactions within a business collaboration that defines interactions between NBN Co and Access Seekers.

The following sections provide an overview of how the CPA is used to satisfy the following roles in the B2B Gateway.

Figure 8 – Service Usage Steps

6.1 Service Definition

NBN Co will use CPAs as the primary device for service definition. The CPA will describe each business service in terms of requests, response and notifications supported in the collaboration between NBN Co and Access Seekers. Each request, response and notification is explained as a message exchange where the transport, messaging characteristics and security constraints for each message is defined.

It is important to note the exception that, in the recommended ebXML framework, a Collaboration Protocol Profile (CPP) is used to describe the B2B capabilities of either B2B participant. In this sense, a CPA is created by combining the NBN Co B2B CPP with an Access Seeker CPP.

This approach requires an Access Seeker CPP to be defined before being compiled into a CPA. Due to extra burden created by this approach on the Access Seeker, NBN Co will use a template CPA to aid the Access Seeker to complete a CPA. The CPA template will be pre-populated with NBN Co services and messaging capability where the Access Seeker capabilities will be required to be filled in to form an agreement.

Note that the NBN Co will initially produce supplementary documentation to describe B2B Gateway operations. However, CPAs are considered the strategic choice by NBN Co.

6.1.1 Service Definition - CPA Components

The terminology used by the ebXML framework when identifying services can vary from other accepted norms used by the industry. The following table describes the key vocabulary used in CPA to describe services. This can be used to map alternate terms of reference.

CPA Definition	Description
Binary Collaboration	A set of business transactions defined between two parties that enables a stand-alone business outcome.
	Refers to a business service.
Actions	Collaborations are defined with actions. Actions can be business transactions or a collaboration activity.
	Refers to an operation within a business service. Collaboration activities are operations that initiate a subsequent collaboration within the context of the binary collaboration, for example: 'Amend Order' operation.
Business Transactions	An atomic unit of communication between two parties. It reflects the state of a binary collaboration.
	Refers to an operation that is a request, response or notification.
Business Document Flow	A business transaction is realised as Business Document Flows between the requesting and responding roles.
	Refers to a message sent as part of a request, response or notification.

Table 9 – ebXML CPA Terminology Mapping

The following section describes a sample service to highlight the key aspects of a CPA used to define a service. It uses a cut-down version of a manage order as an example. (Refer to B2B Interaction Business Processes Technical Specification for a complete view of transactions supported).

The table below shows a sample business service being described, and how the CPA will identify the operations as shown by a seller (NBN Co) role.

Business Service	Role	Action/Transaction	Type	Message Definition
Manage Order	Seller – NBN Co	Submit Order	Can Receive	Submit Order NBN-CIM
		Notify Order Acknowledged	Can Send	Notification NBN-CIM
		Notify Order Accepted	Can Send	Notification NBN-CIM
		Notify Order Complete	Can Send	Notification NBN-CIM
		Notify Order Accepted	Can Send	Notification NBN-CIM

Table 10 – Manage Order - NBN Co Capabilities

Each operation/transaction is described by the message definition it supports as well as the direction in which the message travels. The CPA will further enrich each transaction by specifying messaging characteristics, security constraints and transport protocols.

The CPA will also represent services from the Access Seeker perspective. The operations supported will remain the same; however the direction of message travel will change with the role. The table below indicates how the manage order service will be described from an Access Seeker perspective.

Business Service	Role	Action	Type
Manage Order	Buyer – Access Seeker	Request Order	Can Send
		Notify Order Acknowledged	Can Receive
		Notify Order Accepted	Can Receive
		Notify Order Complete	Can Receive
		Notify Order Accepted	Can Receive

Table 11 – Manage Order - Access Seeker Capabilities

The operation, whether from a sending role or a receiving role, needs to be implemented consistently at each message service handler. However 'Can Send' and 'Can Receive' constructs of the CPA allow some service definition characteristics to be distinguished. For example, the transport end point for an operation is only applicable to be specified on the 'Can Receive' of a receiving role.

The CPA template will include service definition information from both Access Seeker and NBN Co roles. However, NBN Co, as the provider of the B2B services, will be prescriptive and authoritative of the service definitions and the underlying messaging and security requirements. Access Seekers are required to comply with NBN Co stated requirements. Steps followed by the Access Seeker to complete a CPA template are discussed further in *Section 6.3: Service Binding*.

6.2 Service Publication

NBN Co will communicate services supported by the B2B Gateway by publishing CPA templates. This could constitute the primary form of service publication.

NBN Co will share all available CPA templates and their versions that can be used by Access Seekers to form an agreement. CPA templates that are no longer available to form new agreements but are currently being used by Access Seekers will be available, but will be marked inactive. All other CPA templates used in the past with no active subscriptions (that would have been migrated) will not be published, and will be archived at NBN Co.

6.3 Service Binding

NBN Co will use a CPA as the primary tool to facilitate the role of service binding in design time. Conceptually, a Business-to-Business (B2B) server at each party's site implements the CPA and Process Specification document. To configure the two parties' systems for B2B operations, the information in the CPA and Process Specification documents at each party's site is installed in the run-time system.

The service binding process is defined as follows:

- NBN Co will publish a CPA template that describes business services and operations provided. It will detail which messages NBN Co can receive and send as well as the security constraints and message characteristics requested by the potential Access Seeker. It will specify receiving transport end points and their connectivity requirements.

Access Seekers who wish to subscribe to the service can obtain the CPA template. They will be able to interpret the operations supported and specify the information required, such as receiving end points to complete the template.

A completed CPA requires to be submitted and approved by the NBN Co. The process of agreement of a CPA is yet to be determined. It could be validated by tools that parse the CPA and check for compliance or by runtime validation on a staging environment.

Once accepted, the exact instance of the CPA is shared by NBN Co and the Access Seeker to configure their respective message service handlers.

In the manage order service example, the Access Seeker will be required to specify end points and security certificates to be used for each 'Can Receive' operation to complete the CPA template. Other parameters required to be specified in completing a CPA template will be discussed in detail in a future version of this document. Once a CPA template is completed by the Access Seeker, the CPA instance can be verified and executed to complete service binding.

NBN Co requires the Access Seeker to comply with the reliable messaging and security constraints that are defined for each operation. NBN Co may consider negotiating some parameters, a customised solution for an Access Seeker is currently not being considered.

6.4 Execution

An agreed instance of a CPA forms the basis of run-time binding and execution between NBN Co and the Access Seeker B2B Gateways.

The B2B servers on either side include the run-time software, which includes:

- Middleware that supports communication with the other party

- Execution of the functions specified in the CPA

- Interfacing to each party's back-end processes, and

- Logging the interactions between the parties for purposes such as audit and recovery.

6.5 Benefits of CPA-based Service Definition

It is expected that a CPA based service definition approach will yield benefits to Access Seekers and NBN Co. A CPA enables message service handlers to be automatically configured with the appropriate tooling. This greatly reduces integration complexity for the Access Seeker. It is also significant that this approach does not mandate the automatic configurations. A message service handler can be configured manually by Access Seekers without requiring tooling.

Furthermore, CPAs provide good versioning support. The precise descriptions make it easier to distinguish CPAs from one and another.

7 Access Seeker Integration Guide

7.1 Stakeholders

The following are stakeholders in the NBN B2B infrastructure and are responsible in some way for administration, management and operations.

- **NBN Co** - The provider of the B2B Gateway and related infrastructure, NBN Co is responsible for administration, support, maintenance and future planning.

- **B2B_Admin** – The section of NBN Co that is responsible for the management of Access Seekers on the NBN B2B infrastructure.

- **Access Seekers** - All Access Seekers that connect a Message Service Handler (MSH) to the NBN Co B2B Gateway in order to transact with NBN Co.

7.2 Environments

The NBN B2B infrastructure will consist of three environments:

- An Access Seeker development sandpit suitable for Access Seekers to perform their own B2B Gateway evaluation, B2B Gateway component and integration testing, and NBN Co pre-certification testing. Multiple interface versions will be supported by NBN Co allowing Access Seekers to verify their production patches, or new BSS/OSS capabilities.

- A certification environment under the control of NBN Co and used for Access Seeker BSS/OSS/B2B gateway certification testing.

- The production environment.

Each NBN B2B environment is configured individually. Therefore, an Access Seeker may use the same Participant ID, but with a different URL, on each NBN Gateway, thus enabling different development or production MSHs to be used.

Both the Access Seeker development and certification environments comprise test stubs that emulate NBN Co/ BSS/OSS and offer a full range of deterministic behaviour in accordance with the NBN B2B Interaction Business Processes Technical Specification.
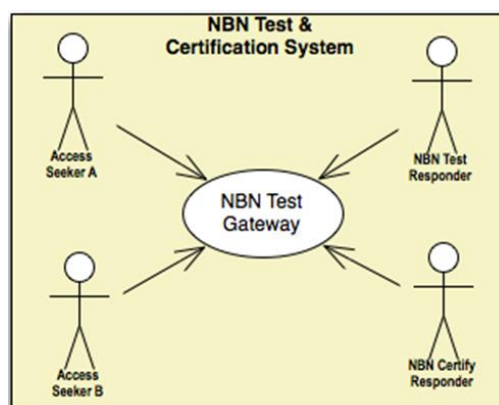

Figure 9 – NBN Co Certification System

7.3 Responders

The Responders are a part of the Test Gateway infrastructure and are available for Access Seeker use. The Responders provide stub functionality as if the NBN production BSS/OSS were responding. The functionality available is as follows:

Responder	Function
nbnXML validation	Submit an nbnXML document and have it validated against the nbnXML schema.
Certification	A number of screens to guide an Access Seeker through the certification process.
ebXML	Messaging functions (acknowledgments, errors, etc).
nbnXML	Transaction validation and/or acknowledgment as per relevant process.

To use the above functionality send an ebXML message containing an NBN-XML transaction, with the Receiver set to NBNTEST or NBNCERTIFY, through the Test Gateway. The Responder will receive the message and return an ebXML acknowledgement. The Responder will then validate the nbnXML transaction and return an ebXML message containing the appropriate nbnXML transaction response.

7.4 Certification

The certification process involves sending documents to, and receiving documents from, the Certification Responder (NBNCERTIFY). To support the process a browser based User Interface is available on the Responder.

Once certification is carried out B2B_Admin will review the transactions and acknowledgements that have been sent by the Access Seeker. A report will be created and forwarded to the Access Seeker. If satisfied with the results, B2B_Admin will also notify the Access Seeker of successful certification.

Following successful certification B2B_Admin will create a profile on the Production Gateway which, when activated, will enable the Access Seeker to send production transactions to NBN Co.

7.5 Activation

An Access Seeker must formally request activation of their profile on the Production B2B Gateway through the B2B_Admin. At a minimum, for activation, B2B_Admin need the following information:

- The date that the Access Seeker wishes to become active in the Production environment

- The transactions that that the Access Seeker intends to use.

- Products they intend to order.

- Digital Certificate information.

B2B_Admin will confirm certification for the proposed transactions and activate the profile at the appropriate time.

7.6 Security

All communications between the B2B Gateway and an Access Seeker MSH are carried out using HTTP/S over SSL. SSL encryption is controlled using public/private key pairs, with a different key pair required to connect to each B2B Gateway (Development sandpit, or Certification, or Production). In addition, selected ebXML messages are digitally signed using different key pairs to guarantee data integrity and message non-repudiation. The B2B Interaction Business Processes Technical Specification defines messages that are required to be non-repudiation. Australian Gatekeeper compliance requires that different keys are used for encryption and signing.

NBN Co's server certificate will be bound to a fully qualified domain name resulting in any failover scenario being transparent to the Access Seeker from a certificate trust chain verification perspective.

Further details of NBN's security architecture, digital certificates and authentication processes will be detailed in a future B2B Developer's Guide.

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B2B Gateway Technical Specification

8 Key Terms

Term	Description
Access Seeker/s	The term to jointly refer to Retail Service Providers (RSP) and Wholesale Service Providers (WSP). All entities that connect a Message Service Handler (MSH) to the NBN Co Gateway in order to transact with NBN Co.
Actions	Collaborations are defined with actions. Actions can be business transactions or a collaboration activity. Refers to an operation within a business service. Collaboration activities are operations that initiate a subsequent collaboration within the context of the binary collaboration, for example: 'Amend Order' operation.
Assurance	The functional area that performs assurance for Services and Resources and covers Incident Management performance management, incident management and alarming.
B2B	Business-to-Business
B2B_Admin	The section of NBN Co that is responsible for the management of Access Seekers on the NBN B2B system.
Binary Collaboration	A set of business transactions defined between two parties that allows enables a stand-alone business outcome. Refers to a business service.
BPMS	Business Process Modelling System
BPSS	Business Process Specification Schema
Business Document Flow	A business transaction is realised as Business Document Flows between the requesting and responding roles. Refers to a message sent as part of a request, response or notification.
Business Transactions	An atomic unit of communication between two parties. It reflects the state of a binary collaboration. Refers to an operation that is a request, response or notification.
Buyer	The receiving party in the context of the CPA.
CA	NBN Certificate Authority
Certification	A number of screens to guide an Access Seeker through the certification process. The certification process involves sending documents to, and receiving documents from, the Certification Responder (NBNCERTIFY).
CIM	Common Information Model
Collaboration Layer	This is an abstract layer that defines the choreography of operations allowed be used between NBN Co and Access Seekers. It explains the business services that NBN Co offers by specifying the operations that are available and allowed to be used to achieve a business outcome.
Commercial Transaction	To initiate long-running processes within NBN Co.
Communications Alliance	The Australian communications industry forum that worked collaboratively with NBN Co in establishing the B2B interaction process requirements.

Term	Description
Core Components	Framework for business documents ebC CTS 1.9
COTS	Commercial Off-the-Shelf
CPA	Collaboration Protocol Agreement (CPA) to facilitate service description, publication, binding (and discovery) of all services offered to Access Seekers via the B2B Gateway. A Collaboration Partnership Agreements (CPA) serves two purposes: It describes the operations as it would be used by the higher layers to construct business processes. It defines the security and messaging characteristics required to implement the operation in the messaging layer. A CPA is an XML document that describes all the valid visible, and enforceable, interactions between two parties.
CPP	Collaboration Protocol Profile (CPP) as a tool that can individually describe the NBN Co B2B services and messaging capability from that of an Access Seeker.
CSR	Certificate Signing Request
Drummond group	Drummond group certifies ebXML products based on interoperability tests. A list of certified products can be found via the following link: http://www.drummondgroup.com/html-v2/ebXML-companies.html
ebCPP	Collaboration-Protocol Profile and Agreement Specification 2.0 (ebCPP) of the ebXML framework which defines the mark-up language and vocabulary for creating electronic CPA.
ebMS	ebMS is an extension of the W3C SOAP standard that supports secure, reliable and non- repudiable messaging.
ebMS MS2.0 Plug-ins	Functional modules that comply to the ebMS 2 specification which provide specific messaging functionality.
ebXML Framework.	A detailed description of ebXML can be found at http://www.ebxml.org
ebXML specifications	Messaging functions (acknowledgments, errors, etc).ebXML messaging specification (ebMS 2.0) to enable two-way messaging between NBN Co and Access Seeker. ebXML infrastructure that is specified in ebMS.
EIS	Enterprise Integration systems
End User	The customers to whom an Access Seeker supplies (or proposes to supply) a carriage service or content service for final consumption by that customer. End Users have no direct commercial relationship with NBN Co.
ESB	Enterprise Service Bus
Execution	An agreed instance of a CPA forms the basis of run-time binding and execution between NBN Co and the Access Seeker B2B Gateways.
Fulfilment	"Lead to Cash" is a stage in the NBN Co End-To-End Value Stream Business Model.
HTTP/S	Hypertext Transfer Protocol
ICF domain	Integration & Core Flow Domain
Idempotent Request	A property of certain operations that they can be applied multiple times without changing the result

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Term	Description
L2C	Lead to Cash
Lifecycle Management	Outlines the L2C Process that are bound Products and susceptible to change.
Message Exchange Pattern	A number of request and response messages that describe a collaboration toward an outcome.
Messaging	ebXML Message Specification and Message Service Handler ebMS 2.0
Messaging Specification	ebXML messaging specification (ebMS) is an open standard for messaging that enables secure, reliable and non- repudiable exchange of messages between two parties. It is independent of the transport protocol and payload being used and reuses a number of existing standards and protocols.
MS2.0 adaptors	A 3rd party software component used to connect the MSH to a specific middleware application,
MSH	Message Service Handler
NBN CA Certificate	Digital certificate for an NBN Certificate Authority.
nbnXML	Schema used for transaction validation and/or acknowledgment as per relevant process.
nbnXML validation	Submit an nbnXML document and have it validated against the authoritive nbnXML schema.
NFAS	NBN Fibre Access Service
NICC	NICC Touch Points
NICC	UK interoperability standards group
Notification	To notify important events of a long-running process to Access Seekers.
Non-repudiation	Relates to digital signatures in cryptography that provides proof of integrity and origin of data in the context of messages exchanged.
NSAS	NBN Satellite Access Service
NWAS	NBN Wireless Access Service
Open Source implementations	Open source describes practices in production and development that promote access to the end product's source materials, with the end-product, source-material and documentation available at no cost to the public.
Operation Layer	This layer implements business operations specified by the B2B. It consists of Request, Response and Notifications that exchange NBN-XML messages. Operation equivalent to NICC touch point or equivalent construct. Operations can be one-way or two way.
Participant IDs	Participant IDs of NBNTEST (Sandpit) and NBNCERTIFY (Certify).
Private key	The secret part of a private key/public key pair used in public key cryptography (PKI).
Product/Process Publication	Business Process Schema – detailing process supported ebBP SS 2.0
Production Gateway	The B2B Gateway that sends/receives messages in the NBN Production systems.

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Term	Description
Public Keys	The public part of a private key/public key pair used in public key cryptography (PKI).
Query Response	Used by a requester for an information query that responding partner already has.
Request	Any query, call, application or demand for IT-related services that is not part of standard service operation (i.e. **Not** an incident).
Request-Confirm	Used for business contracts where an initiating partner requests confirmation about their status with respect to previous contracts or a responder's business rules.
Request-Response	Support near real-time business transactions that are stateless.
Service Binding	NBN Co will use a CPA as the primary tool to facilitate the role of service binding in design time. Conceptually, a Business-to-Business (B2B) server at each party's site implements the CPA and Process Specification document.
Service Publication	CPA (Collaboration Protocol Agreement) – detailing service bindings and messaging parameters. ebC PP 2.0
Service Publication	NBN Co will communicate services supported by the B2B Gateway by publishing CPA templates. This could constitute the primary form of service publication supported.
SID	Shared Information Data
SSL	SSL encryption is controlled using public/private key pairs, with a different key pair required to connect to each Gateway (Test/Production). In addition, selected ebXML messages are digitally signed using the same key pairs to guarantee data integrity and message non-repudiation.
Seller	The sending party in the context of the CPA.
Test Gateway	The B2B Gateway that sends/receives messages in the NBN Test systems.
Transaction	A number of request and response messages that form a transaction to determine an outcome.
Transaction Load	A measurement of system resource usage caused by B2B Transactions.
Transport Layer	The underlying communication between the B2B Gateway and the Access Seeker systems will be established with HTTPS over the internet.
Transport Services	Transport Services
UMM Interaction Patterns	UN Modelling Methodology (UMM) interaction patterns that will be supported by the B2B Gateway.
URL	*Uniform Resource Locator,* the global address of documents and other resources on the World Wide Web.
W3C SOAP	W3C SOAP standard
WS-CDL	Web Services Choreography Description Language (WS-CDL)
XML	Extensible Markup Language

9 Document Control

Revision History

Major changes to this document are listed in the table below for each version of the document distributed.

Date	Version	Author	Description/Section Revised	Reviewed By
18/01/2011	V0.12	Guy Liyanage / Conrad Fredericks	Public draft for comment	Roger Venning
2/05/2011	V1.0	Guy Liyanage / Conrad Fredericks	Updated following industry consultation	Martin Pittard

Providing Feedback

Please direct any feedback regarding this Technical Specification to your Account Manager or feedback@nbnco.com.au