TECHNICAL SPECIFICATION

NBN Product Definition Specification

Systems Architecture and Technology

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Document Number:	NBN-TE-CTO-210
Author:	Guy Liyanage
Owner:	Roger Venning
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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 • NBN Co vendors of the Integration and Core Flow (ICF) domain to aid the design and development of the B2B gateway.
Purpose	This document details the schema, technical specifications and overall architecture proposed for product definition by the NBN Co in support of the Industry Interface Concept.
In scope	The contents of this document represent NBN Co's current position on the subject matter.
Out of scope	
Important Note	This specification represents the culmination of 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.	Industry Interface Concept			
2.	B2B Technical Specification	NBN Co	18 Jan 2011	0.12
3.	B2B Interaction Process Specification	NBN Co	18 Jan 2011	0.10

1.2 Role Descriptions

Term	Description

2 Overview

NBN Co will provide Access Seekers with a means of product description that is machine-readable. NBN Co aims to converge on an Industry standard for product description so that current and future NBN Co products as well as subsequent Access Seekers products can be consistently described. The wide adaptation of machine-readable product definition will allow for more efficient and reusable business systems to be constructed. NBN Co aims to facilitate Access Seeker systems architecture where new products or new versions of existing products can be easily adopted by their systems with low integration costs.

This document describes the following:

- Challenges and requirements that need to be met by a product definition standard:
  - o Section 3.1 Definition Requirements provides an example of the detailed semantics required by such a standard.

- Product definition schema proposed by NBN Co:
  - o How the schema will facilitate the semantic requirements outlined, and
  - o How the Tele-Management (TM) Forum Shared Information Data (SID) information model has been adopted for the purpose.

- How the product definition can be used within NBN Co and by Access Seekers:
  - o How resilient and adaptable systems architecture can be set up NBN Co and Access Seekers.
  - o Early thoughts on how the product lifecycle and versioning control will be managed.

- Proposed schema and worked examples for review (see Appendices).

3 Product Definition

The NBN Co B2B gateway is designed to support and promote the adaptation of the Industry Interface Concept that will facilitate an NBN Co Operating Model for Access Seekers. (Refer to the Industry Interface paper). Product Definition plays a central role in the make-up of the industry interface model.
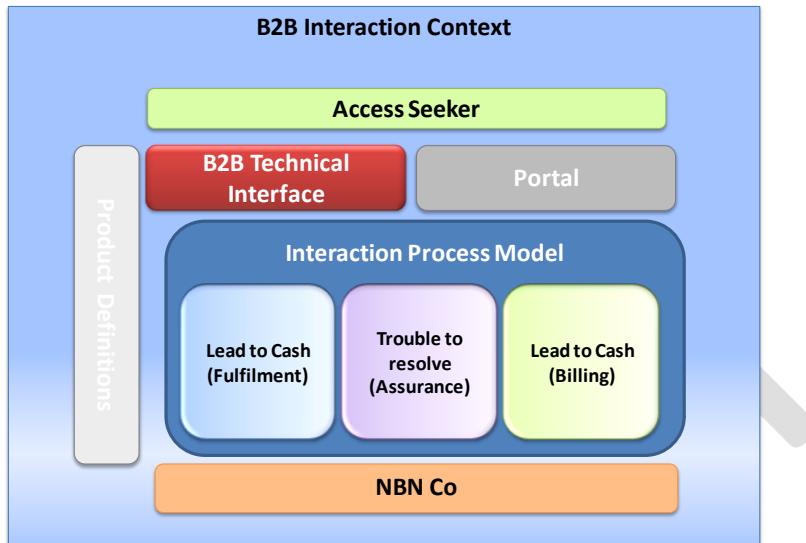
Figure 1 – Industry Interface Model

This model requires a product to be defined by the data requirements as well as the exposed processes relating to the 'Fulfilment', 'Assurance' and 'Billing' of the product. In order to achieve this, a structured and agreed method of product description, that is flexible and rich with semantic support, is required. For instance, NBN Co seeks to support the following functionality for 'Order Placement'.

NBN Co will provide a service to share product definitions with Access Seekers via the B2B gateway. The product definition defined will be used (at run-time or design time) to determine how a valid order can be placed with NBN Co and guide the Access Seekers on completing the order. The product definition will contain the valid order options and the business rules required.

Figure 2 – *Product Definition vs. Product Instance Relationship* shows two possible applications of a customer order scenario as constructed by an Access Seeker.
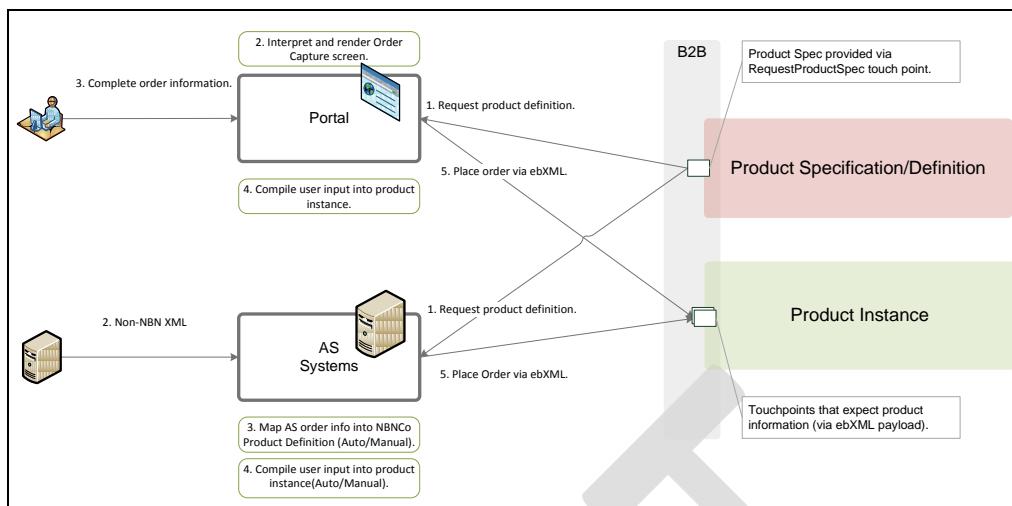
Figure 2 – Product Specification vs Product Instance Relationship

In the Product Definition scenario, a Portal is used to facilitate order capture directly by a human. The portal recognises the product definition and renders screens to guide and validate the product order capture. The portal can render screens on run-time based on a product definition.

The Product Instance Relationship scenario is a more integrated approach where the Access Seeker system performs mapping of order information to fit the product definition requirements. The mapping will be done during design time.

A customer order scenario is one example of a process where product definitions become relevant. There will be other stages in the Lead to Cash (L2C) and Trouble to Resolve (T2R) processes where product data requirements will be required, for example, 'Service Qualification' of product might require some product information be provided. The L2C process includes operations to service qualify a potential end user, to place an order, to enrich orders with information such as appointment details, to modify in flight orders etc. The T2R 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.

Similar to data requirements, there is process dependency based on product. Product definitions become relevant through various stages in the L2C and T2R process. Customer Order placement is an example of such a process. There are other internal NBN Co processes in Fulfilment, Assurance and Billing that are pertinent to the product or expose some relationships and constraints. Therefore it is necessary to be able to define the data requirements pertinent to processes, especially with respect to process touch points between buyer and seller across organisational boundaries as detailed in the Industry Specification Paper.

The two fundamental aspects of this solution are:

- Ability to define characteristics, attributes and rules of a product in a consistent and machine-readable manner,
- Ability to use the definition as a template to instantiate a valid collection of data.

3.1 Definition Requirements

NBN Co requires the ability to describe a product and its specifications to Access Seekers in a consistent manner. The method of defining a product should be:

- Flexible enough to meet present and future NBN Co product and marketing strategies,
- Decoupled from the underlying service specification,
- Machine and Human readable.

This section identifies some of the product definition requirements in detail by describing a sample NBN Co Product and analysing the semantics required to explain the product data requirements.

Note: The product described is not complete and is not intended to represent a final product offered by NBN Co. They serve as examples to understand the product definition capability required.

The NBN Co Fibre Access Service comprises four components: the User Network Interface, Access Virtual Circuit, Connectivity Virtual Circuit and Network-Network Interface. The UNI and AVC components are required for each end-user and are ordered together. For the purpose of this example, we assume that NBN Co offers a 'data' product that provides Access Seekers with a data connection. The product definition includes the information required to activate or configure a data AVC and UNI-D.

The product characteristics that describe the products are show grouped by AVC and UNI-D on the tables below. Product characteristics are used as the building blocks to define a product. A product characteristic can be defined as a quality or distinctive feature of a product. They can also be used to describe rules that govern the product.

Data AVC Product Characteristic	Selectable Values	Description
AVC Type	Unicast (1:1)	Specification of the AVC type
Access Loop Identification Mode	None	Information into the AVC that enables an Access Seeker to identify it.
	DHCP Option 82	
	PPPoE IE	
C-TAG Mapping	<Integer: (0-4000)>	Requested C-TAG at UNI-D, range (0-4000)
Traffic Class Availability	TC_4 Active	Traffic Class Availability
CVC Id	<Valid CVC Id>	Identification of the Connectivity VC that the Access VC is to be delivered on.
UNI Reference	UNI ID (Existing)	Identification of the UNI that the Access VC is terminated on. An existing UNI or an Order Id for a UNI can be specified.
	UNI Order Id	
TC_4 Bandwidth Profile	Upstream	Select Upstream/Downstream Speed combination. traffic class allocations applicable to tagged/priority-tagged/DSCP-mapped UNI-D.
	Downstream	

Table 1 Data AVC Product Characteristics

UNI-D Product Characteristic	Selectable Values	Description
UNI Type	UNI-D	The Access Seeker must select which type the requested UNI is.
Speed Duplex	Auto-negotiation	Configure the physical parameters of the Ethernet port.
	10Mbps Half Duplex	
	10Mbps Full Duplex	
	100Mbps Half Duplex	
	100Mbps Full Duplex	
	1000Mbps Full Duplex	
VLAN Tagging	DSCP Mapped	The tagging and traffic identification options of the UNI
NTU Reference	NTU ID (Existing)	Identification of the NTU that houses the UNI. An existing NTU or an Order Id for a NTU can be specified.
	NTU Order Id	
NTU Port Id	Next Free	NTU Port Id to activate UNI
	Port 1	
	Port 2	
	Port 3	
	Port 4	

Table 2 UNI-D Product Characteristics

There are a number of requirements that must be facilitated when describing a product through an electronic interface and format. The following table takes a look at those requirements using the data product described above as an example.

Requirement	Scenario
Requirement 1 Represent a product characteristic that allows the predefined options of which one value is required to be picked.	Most product characteristics have a predefined set of values that can be selected. E.g. Access Loop Identification Mode has options of "None", "DHCP Option 82" or "PPPoE IE" of which one value can be selected. Characteristics such as "AVC Type" in the sample product above, will only have one selectable value "Unicast(1:1)" for a Data AVC.
Requirement 2 Represent a product characteristic that allows the predefined options of which more than one value can be picked.	It is also possible that product characteristics allow multiple values to be selected.

Requirement	Scenario
Requirement 3 Represent characteristics that are self-defining like "DHCP" for access loop identification.	E.g. Traffic Class Availability characteristic allows "TC_4Active" that represents the traffic classes available on the sample product. Although, only one traffic class is available in the sample product above, NBN products can include multiple traffic classes of which more than one traffic class can be activated.
Requirement 4 Represent a complex characteristic that requires a collection of sub characteristics to be defined. **Requirement 5** Represent the hierarchical dependency from one characteristic to its dependent characteristics.	Some characteristics are represented in a hierarchy of sub characteristics that collectively define its value. E.g. Bandwidth is product characteristic that require to be defined in terms of multiple sub characteristics. I.E. Bandwidth should be specified per traffic class activated for the service. And for each traffic class, bandwidth should represent the upstream and downstream profiles. Therefore a holistic bandwidth characteristic requires multiple sub characteristics to describe it.
Requirement 6 Represent characteristics that require a value to be provided confirming to type and range validation.	Some characteristics require a value to be provided and optionally define a range and/or a format that is expected. E.g. C-Tag mapping is required to be an integer and has to fit between 0-4000. Other possible examples are IP addresses etc.
Requirement 7 Represent default values for characteristics that are defined by optional characteristics or free-form fields.	Defaults can be applied to characteristics. E.g. Access Loop Type product characteristic identifies "None" as the default vale. Similarly, Duplex characteristic of a Data UNI identifies "Auto Negotiation" as the default selection. Similarly, characteristics that require a formatted value might be presented with a default, for example a C-TAG characteristic can be defaulted to 0 if no other valid integer is provided
Requirement 8 Represent business rules around repeating characteristics within a product definition.	Although not included in the sample product above, a product may require defining characteristics that are allowed to be instantiated multiple times based on business rules. E.g. If the product were to be extended to allow multiple VLANs, characteristics such as C-TAG will be required to be instantiated for each VLAN. Here, the C-TAG characteristics are required to be defined multiple times to match the number of VLAN's.
Requirement 9 Represent interrelationships between product characteristics and the underlying cause and effect.	On occasions, product definitions are required to communicate more complex business rules driven by the interrelationships of characteristics. E.g. A selection of 100BaseTx for PHY interface characteristics, along with a bandwidth profile >100Mbps are incompatible options. A 100BaseTx interface should restrict the bandwidth profiles available. **Note: Alternatively, such rules can be allowed to be validated as part of the NBN Co order processing systems.**

Requirement	Scenario
Requirement 10 Represent product definitions in terms of groups of product specifications (components).	Product characteristics can often be grouped into logical components where they intuitively belong. E.g. Characteristics are grouped into AVC, UNI in our example above. They represent the underlying service construct of the NBN, and each identifies information required to activate the corresponding service. The ability to group characteristics into components allows a more modular approach for product definition where components can be reused in constructing a product. E.g. The Data UNI component will be reused in other products that require a UNI-D as a physical interface.
Requirement 11 Ability to link product components together in specifying a product.	This also enables the ability to reuse existing resource as part of a new product where applicable. E.g. The data product above requires a UNI-D for the Data AVC to terminate on. Since a UNI-D can be shared across many Data AVC's, an existing UNI-D can be provided instead of having to place an order for a new UNI-D. In such a scenario, only the AVC component is required to be filled with a reference to an existing UNI-ID or order replacing the need to fill in a UNI-D component.
Requirement 12 Represent versions for a given product definition.	Products can be introduced or changed based on market demand and customer requirements. Therefore the ongoing maintenance and lifecycle management of the product definition strategy is vital. The product definition versioning should be considered from the perspective of both Access Seekers and NBN Co. Access Seekers would require a complete product definition to be versioned holistically for identification and integration purposes. Any change in product characteristics within a definition would require the product definition to be incremented. It will be possible to identify major and minor versions, where minor versions identify a backwards compatible change. From the NBN Co perspective, versioning requirements extend to components within a product definition. The product components will strongly align to underpinning service constructs such as UNI, an AVC, CVC and NNI. However, the components will be subsets of the capability that NBN Co systems will manage. E.g. The UNI capabilities exposed through the sample product only represent a subset of the total set. The component is put to get with characteristics that are suitable and required for the given product.
Requirement 13 Represent product characteristics in a manner that could be mapped to inform service specifications.	Although products will be described in terms of components and characteristics based on NBN service constructs, it is required to maintain product definitions separate to service definitions – but still allowing them to be mapped.

| Requirement	Scenario
	E.g. A NTU Port ID is a product characteristic in a UNI-D product component. From a product perspective, the NTU Port ID specification should allow a 'next available' value as it is a valid way of describing a product offering. From a service perspective, the NTU Port ID characteristic is distinct from its product characteristic counterpart. Here, The UNI-D service specification should be modelled as a characteristic that requires a specific integer value – the assigned NTU Port ID. This follows the SID relationship where a product characteristic can be used to define or map one or more service specification characteristics. It is recommended that the service specification be constructed using similar semantics to the product definition.

The requirements above can be identified as capabilities that the Product Definition Schema and its various elements will provide. Each requirement will be fulfilled by part of the schema. They are summarised in terms of the roles that schema element will play.

Requirement	Roles	Description
1	Enumeration	A characteristic that is defined by a set of options of which one can be picked.
2	Multi-Select Enumeration	A characteristic that is defined by a set of options of which more than one can be picked.
3	Key	A basic characteristic that identifies a value. A key defines a known entity.
4	Complex Type	A characteristic that is defined by a set of child characteristics.
5	Characteristic Relationship	Ability to link a characteristic to another, where the characteristic type identifies use of the child characteristic.
6	Key Value	A characteristic representing an entity that requires a value
6	Validation	A validation rule described along with a key-value characteristic
7	Default Value	An attribute of an characteristic that defines a default value
8	Multiplicity	A characteristic that defines cardinality rules
9	Rule	Rules that restrict values available for a characteristic.
10	Product Component	Ability to group characteristics together
11	Component Relationship	Ability to link a product component to another through a relationship type.
12	Version	Ability to version components and product definitions.

Table 3 – Capabilities required for Product definition

NBN Co will use a standard schema that supports the capabilities above to describe product data requirements. Section 4.1 Product Definition Schema provides detail on how the capabilities are realised using the schema. Each NBN Co product will be described in an XML file using this product definition schema and will be shared with the Access Seeker as show below.
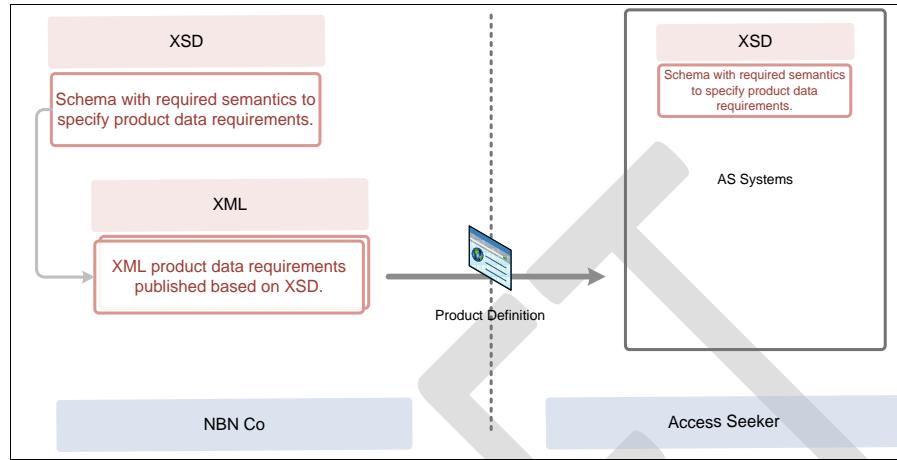

Figure 3 – Product Definition Schema – Concept

As the product schema XSD will remain constant, all current and future NBN Co products will be expressed in a consistent manner to the Access Seeker. Therefore, Access Seeker systems need only be implemented once to support all NBN Co products via the B2B gateway.

3.2   Instantiation Requirements

The Industry Interface Concept requires that the product definition semantics should be able to guide the instantiation of the data requirements. Similarly, instantiated product data should be able to be verified against a product definition it represents. A valid instance will hold information required to link it to the product definition and allow automated verification of a product instance against its product definition.

Essentially product definition semantics federate the responsibility of product data composition based on a dynamic definition issued by NBN Co. However, to leverage this dynamism, NBN Co will provide standardised interfaces that enable Access Seekers to submit instantiated data back to NBN Co.
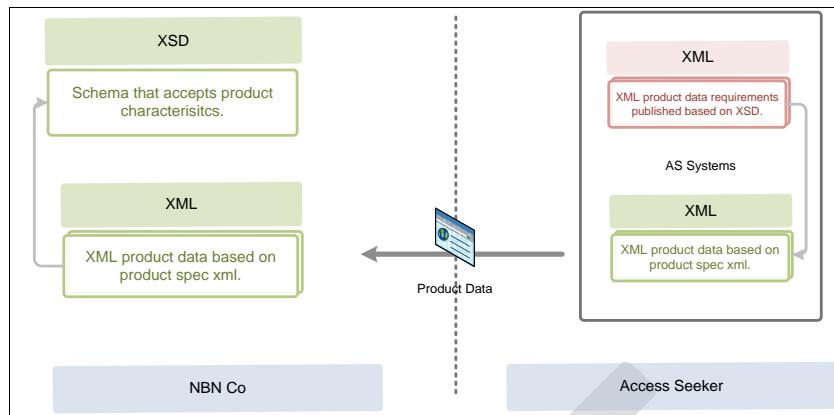
Figure 4 – Product Order Schema - Concept

The standardised interface will be transparent of product to the Access Seeker systems when integrating with NBN Co.

4 Solution Overview

Access Seekers will be provided a service that will define orderable products via the B2B. A product definition will be delivered in the form of an XML file to be used by Access Seekers as a guide for all product data exchanges via the B2B.

Similarly, all services in the B2B that accept product information from Access Seekers will provide a consistent interface for accepting product information. This will ensure that product characteristics on the definition can be consistently applied to L2C or T2R touch points regardless of the product.

For example, a 'Manage Order' service will be able to accept orders for any NBN Co product. The service will be agnostic to product from a touch point perspective. Note, however, that the internal NBN Co process for handling the order may vary based on product.

Figure 5 highlights the main steps in the solution.
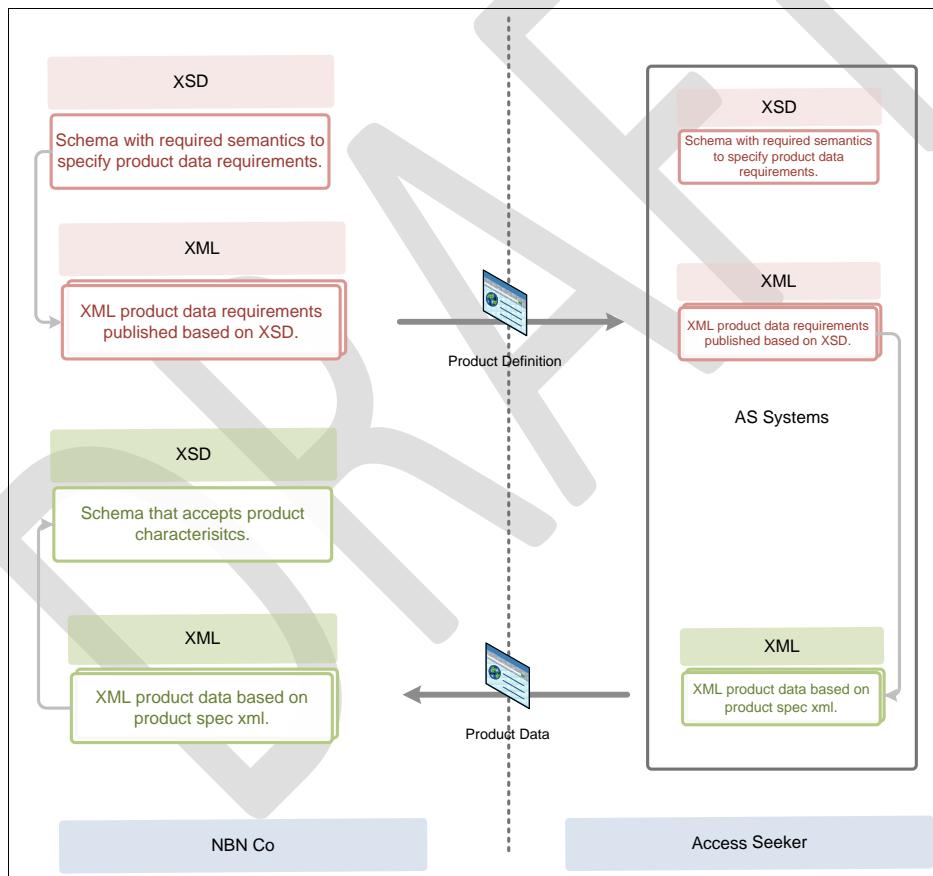
Figure 5 – Product Definition - Solution Overview

The following steps outline the solution at a high level:

1. Access Seekers will be able to query and receive a product definition that conforms to the requirements above. The product definition will be an XML document.
2. This NBN Co service will comprise a stable service interface contract, described by published XML schema. The service contract will have a substantially longer lifetime than the interval between individual new product definitions. Where backward compatibility cannot be maintained, old service providers will be depreciated but retained for not less than two years.
3. Access Seekers will be able to transform/map the product definition XML to construct the product order (for example).
4. The Product Order service interface will be able to accept product orders as characteristics and values. Therefore, a single product order service can be maintained (which is agnostic of the product being ordered from a service interface perspective).

4.1 Product Definition Schema

The product definition schema is designed to be able to define all NBN Co product data requirements. This specification will seldom change, providing Access Seekers with a stable platform into which to tune their systems. Furthermore, the product definition schema is designed to achieve the goals of the Industry Interface Concept. Therefore, it carries added responsibility in that it must aim to:

1. Be consistent, well understood and easy to adopt by the industry.
2. Provide rich semantics to cover NBN Co products as well as other Access Seeker products in the future.

In order to achieve consistency in understanding and vocabulary, and to aid adaptation, the schema is derived from the TM Forum SID. The product definition schema elements (and sections of this document) will use this vocabulary. This document will use the definitions in Table 2 when describing the various aspects of products.

Table 2 – *Product Definition Schema - Element Description* lists the key schema elements used, the relationship to the SID and how each maps to the product definition schema.

Schema Element	Description	SID Mapping
Product Offering	The top level element that represents an orderable product. A product offering is described by one or more product specifications.	As specified. (Bundled offering will be detailed in a future version of this document).
Product Specification	A grouping of characteristics that describe the products and the options available.	As specified. (This will be detailed in a further version of this document).
Characteristic Specification	Specifies a characteristic used to form the overall product definition.	Maps to EntitySpecCharUse SID entity.
Characteristic Specification Value	Used to enumerate values that describe values that a Characteristic Specification can take.	Maps to the EntitySpecCharValueUse SID entity.
Characteristic Spec Relationship	Used to specify relationships between Characteristic Specifications.	As specified.
Characteristic SpecValue Relationship	Used to define dependencies between CharacteristicSpecificationValues.	As specified. (This will be detailed in a future version of this document).

Table 4 – Product Definition Schema - Element Description

The product definition schema describes products using the following reusable SID patterns. These patterns also support the Industry Interface Concept by providing the extensibility required to model Access Seeker products.

1. Entity Specification / Entity (ES/E)
2. Characteristic Specification / Characteristic Value (CS/CV).

The ES/E pattern allows a business entity to be described using an (invariant) specification (template) and any variants specific to the entity. This pattern can be used to describe a product specification that can be instantiated as a product. The CS/CV pattern allows characteristics that make up a specification to be described. This pattern will be used to describe the attributes, their values and any relationships. NBN Co plans to use these patterns and the underlying semantics to describe an increasing number of products in the future.

The sections below describe the key concepts of the schema and how it can be used to define product data requirements and satisfy the general requirements discussed so far. The following examples of the product definition process are attached as Appendices to this document:

- Product Definition Schema

- A sample product being specified using this schema

- A sample product order being filled using the product specification.

4.2 Product Definition Schema – Usage

This section outlines how a product definition provided by NBN Co can be interpreted and used by Access Seekers, including:

1. How to interpret a product definition
2. How to use a product definition
3. How to automate a product definition usage.

4.2.1 Interpretation of a Product Definition

Characteristics are crucial to the communication and expression of product data requirements. Characteristics can be used both to describe aspects of products and also to describe the associated choices and rules. The three central elements used to achieve this are:

1. Characteristic Specification
2. Characteristic Specification Value
3. Characteristic Specification Relationship.

Understanding these elements is important in order to accurately interpret a product definition.

4.2.1.1 Characteristic Specification

A characteristic can be specified (using the entity specification/ entity pattern) using the characteristic specification schema detailed in Table 3.

Element	Description	Required
ID	A unique identification for the characteristic	Required
Name	A word, term or phase by which the characteristic is identified and distinguished from.	Required
Description	A narrative that explains the characteristic in details.	Optional
Value Type	Kind of value that the characteristic could take.	Required, if the specification is not a composite.
Min Cardinality	The minimum number of instances of a characteristic value that can be assigned.	Optional
Max Cardinality	The maximum number of instances of a characteristic value that can be assigned.	Optional
Extensible	If new values are allowed to be added - NBN Co will confirm the use of this attribute in the future.	Optional.
Derivation Formula	An equation to define the value of a characteristic.	Optional

Table 5 – Characteristic Specification - Elements & Description (SID)

An instance of a Characteristic Specification identifies the characteristic by providing a unique ID and name for each characteristic, a description, and the type of value it could take. Furthermore, the Characteristic Specification instance can specify if the characteristic is required to be present when product data is formulated and sent back to NBN Co. This is achieved via the Min/Max cardinality values specified. The cardinality value can also be used indicate whether multiple instances of the characteristic are required to be instantiated.

The Characteristic Specification construct therefore covers for the following requirements described in Table 3 – Capabilities required for Product definition:

- Key Value

- Multiplicity

- Validation.

This element allows a characteristic to be defined. The "ID" and "Name" values will uniquely identify the characteristic being specified. The value the characteristic can take can be defined either as a value type or via a derivation formula.

The min and max cardinality specifies how many instances of the characteristic are required. This allows a characteristic to be purely informational (where it is not required to be instantiated).

4.2.1.2   Characteristic Specification Value

Some characteristic specifications require the ability to define values that the instance of a characteristic could hold. Often, they are expressed as an enumeration in terms of the values by which the characteristic could be described.

An instance of a characteristic specification value can represent a value that a characteristic could take in on the following ways:

1. A single discrete value
2. A range of values allowed
3. A default value (if applicable in a group).

Detailed description of the Characteristic Specification Value is provided in Table 4.

Element	Description	Required
Value Type	The type of the specification value.	Optional
Default	Indicate if the value is the default value for the specification.	Optional
Value	A discrete value that a characteristic could take.	Optional
Unit of Measure	Indicates the unit of measure of the value, if applicable.	Optional
Value from	The low range value that a characteristic can take on.	Optional
Value to	The upper range value that a characteristic can take on.	Optional
Range internal	Specifies inclusion or exclusion of the value range.	Optional

Table 6 – Characteristic Specification Value - Elements & Description (SID)

A characteristic specification value instance can be used to enumerate a characteristic and provide the Access Seekers the option of selecting a value (either as a discrete value or conforming to a range) from the enumeration. The default element value will indicate if the specification is to be used as a default to instantiate the characteristic.

The Characteristic Specification Value construct therefore covers for the following requirements described in Table 3 – Capabilities required for Product definition

- Enumeration

- Key

- Default Value.

4.2.1.3 Characteristic Specification Relationship

Characteristic Specification Relationships allow for composite characteristics to be defined. This is required to manage the dependence and construction inherent in complex specifications. A Characteristic Specification Relationship allows a characteristic to be linked to one or many child specifications with a specified relationship type.

Element	Description	Required
Relationship Type	The value specified or selected for the characteristic.	Required
Char Sequence	Specify the relative order of listing.	Optional

Figure 6 – Characteristic Specification Relationship - Elements & Description (SID)

The Relationship type element is used to specify how to interpret and interact with the Characteristic Specifications related to the head characteristic. NBN Co will use the following two types:

1. Inclusive – To indicate that all related characteristics are required to be honoured.
2. Exclusive – To indicate that only one of the characteristics needs to be selected. This is used as an enumeration, where one characteristic enumerates other characteristics that in turn have their own definition.

Note that a composite characteristic has no char spec values associated to it. It is derived from the child characteristics and their values. A composite characteristic that is defined by child characteristics is required to be instantiated differently based on the relationship type.

An Inclusive Characteristic requires the name/ID of the selected child characteristic to be specified as a value, because that characteristic is defined by the child characteristic selected.

An Exclusive Characteristic does not require any value as its characteristics will bear the value. This is because the characteristic is not being defined by any choice in terms of its immediate characteristics.

The Characteristic Specific Relationship construct therefore covers for the following roles described in Table 3 – Capabilities required for Product definition :

- Enumeration

- Characteristic Relationship

- Complex Type

- Validation

Note: Details on how a product offering and a composite product offering are mapped back to the Main Order Line Item (MOLI) and Order Line Item (OLI) structure of a product order will be described in subsequent versions of this document.

The key concepts of the Product Definition Schema are described below:
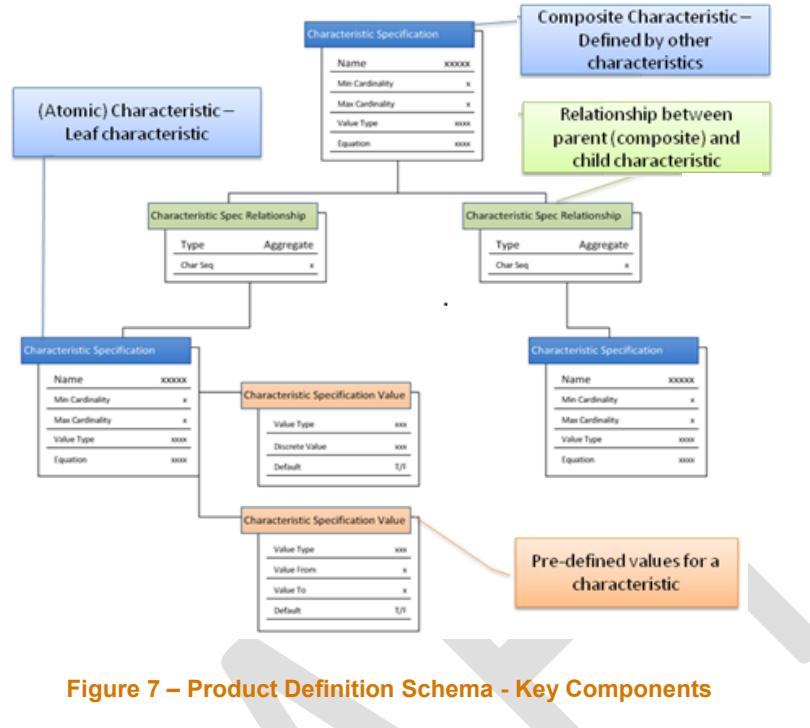
**Figure 7 – Product Definition Schema - Key Components**
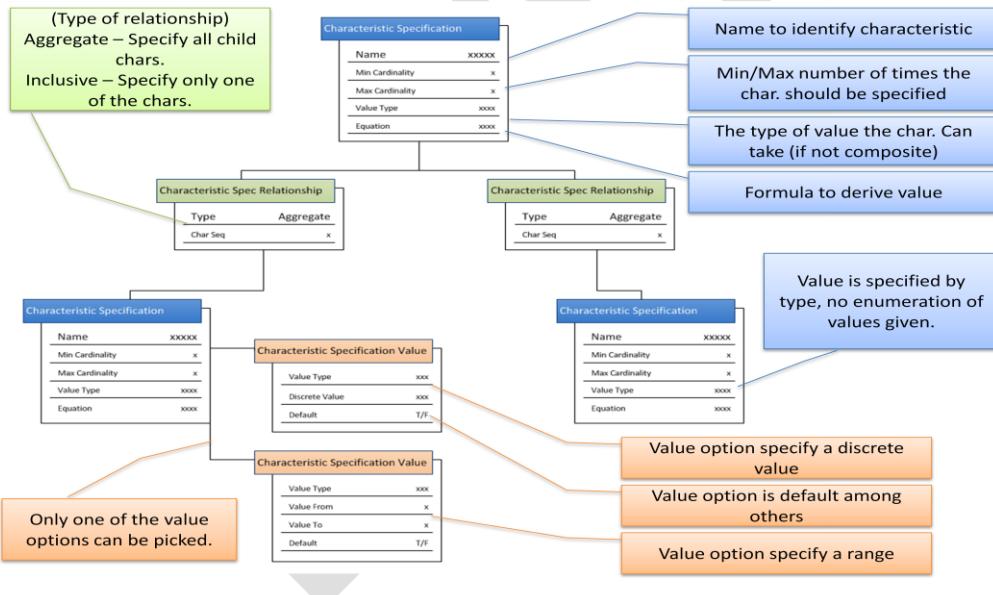
**Figure 8 – Product Definition Schema - Key elements**

4.2.2 Using Product Definitions

As product definitions are described as a set of characteristics, the exercise of using a product definition is narrowed down to specifying the values for the characteristics. A simple repetitive pattern can be used select and assign values to a characteristic.

1. Identify the type of the characteristic (composite or atomic).

2. Identify if a value is required.

3. Select the value via Characteristic Specification Value enumeration or composite relationship type.

4. Assign the value to the characteristic.

5. Process next/child characteristic.
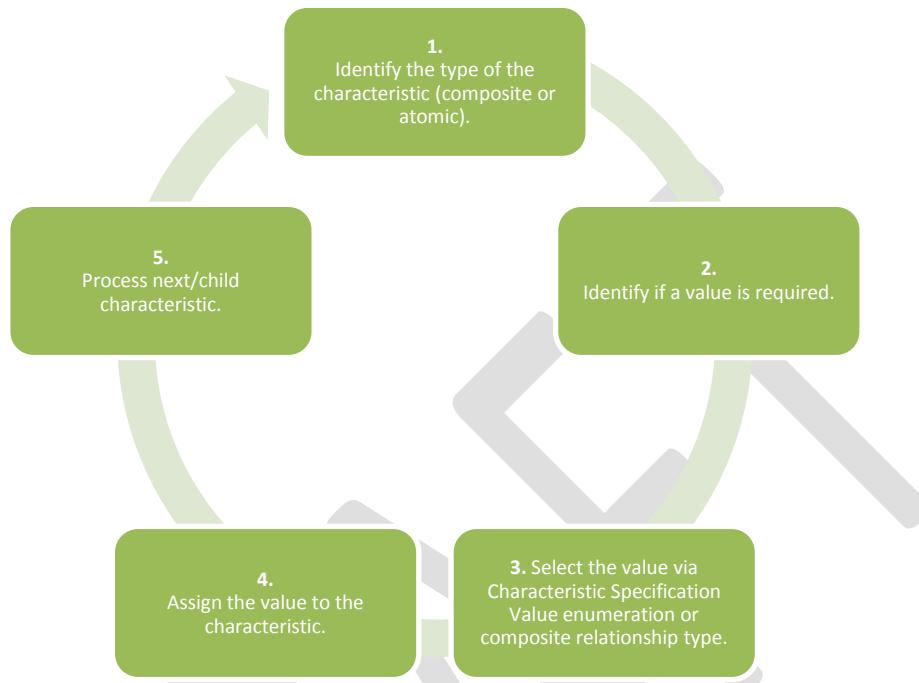
Figure 9 – Pattern to process a Product Definition

Following the process in Figure 7, Access Seekers will be able to produce a list of characteristics and characteristic values that specify the product data required. In contrast to the Characteristic Specification, which may contain a hierarchy, the characteristic values are not required to mimic the same hierarchy and can be defined in one level.

NBN Co will provide a schema that supports instantiation of all product characteristics. This will be derived from the NBN Co Information Model (CIM). CIM specifies that the SID business interaction entity should be used to model any Access Seeker business interaction. The business interaction item contains a reference to a Product schema which allows the characteristic values to be specified. Therefore, any subtype of a business interaction, ('Product Order' for example), will have a consistent interface where it could accept information from a product definition.

Note: The schema relates to the same set of requirements as the Product Definition Schema as specified in Section 4.1 – *Product Definition Schema*.

Figure 8 (below) is a snippet from 5.3 Appendix C – Product Order Sample where an NBN Product Order is filled using characteristics defined in the product definition. The NBNProductOrderItem (a type of Business Interaction Item) contains an NBNProduct element that contains the characteristic specification and values as shown below.

The NBNProductOrder element contains hierarchy of recursive ProductOrderItems. The top most ProductOrderItem (referred as a Main Order Line Item – MOLI) contains the Product reference that identifies the product offering being ordered as shown below.
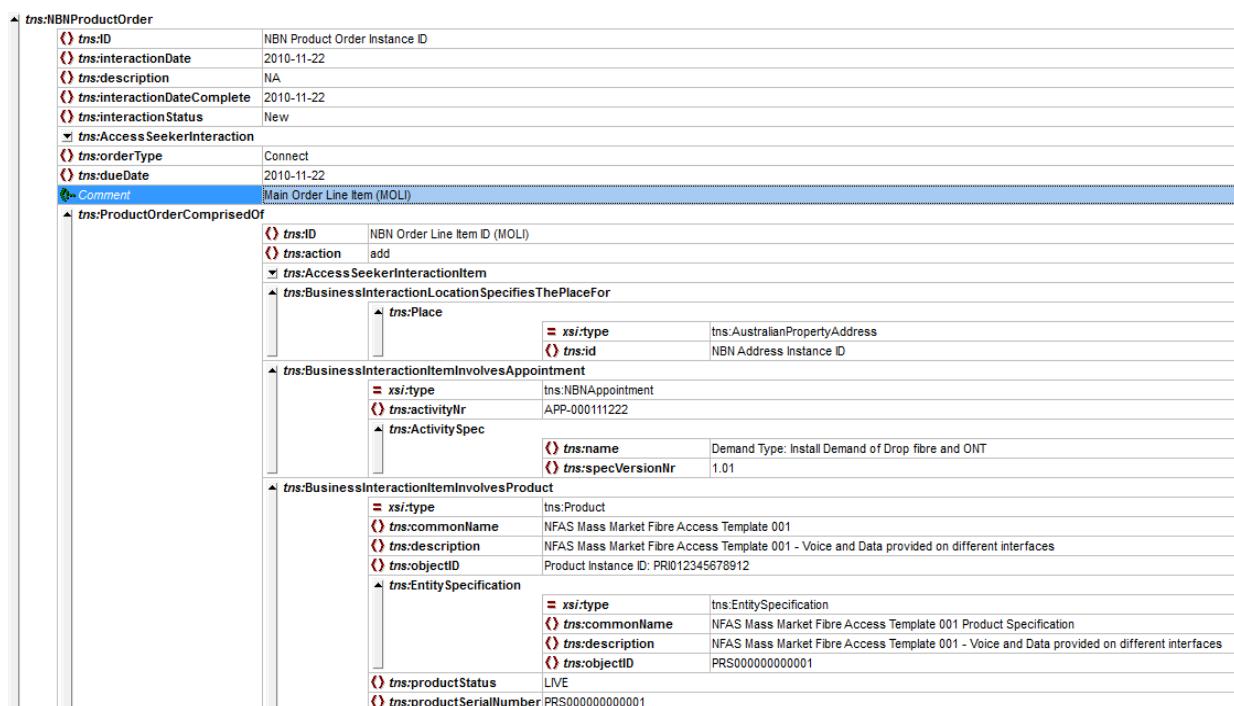
Figure 10 – NBN Product Instance – Structure

Each product specification within the product offering is mapped into a sub productOrderItem following the hierarchy set out in the product definition. The sub productOrderItems (referred to as Order Line Items – OLI's) each contain the values selected for the characteristics within the product specification as show below:
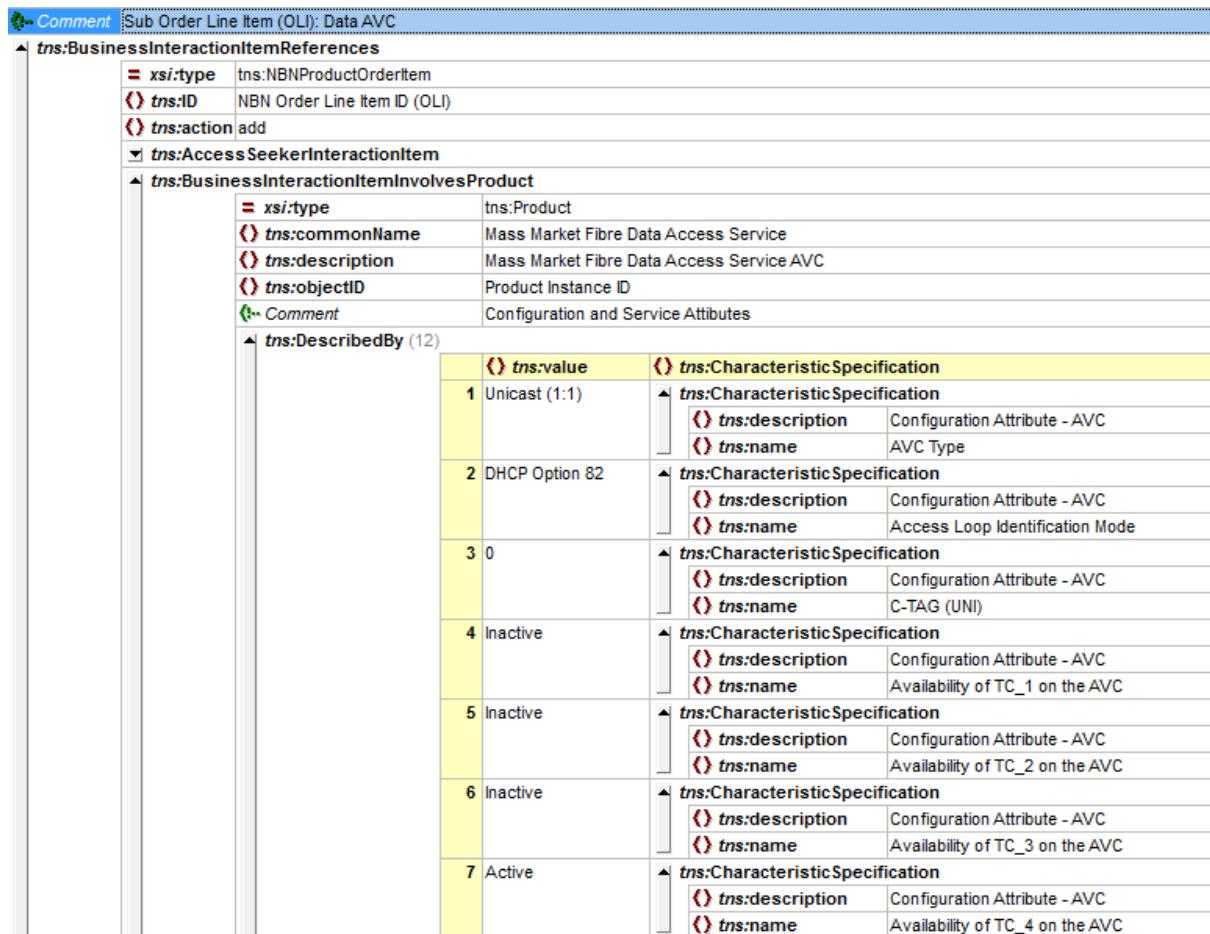
Figure 11 Product Order - Value Assignment

The key elements involved are described below in detail.

4.2.2.1 Product

The Product element is used to describe a product within the context of a business interaction. This element is used as a container for characteristic values specified by Access Seekers. They will be included within ProductDescribeBy elements.

The Product element also acts as a counterpart of the ProductOffering. The Name, Description and Serial Number elements will be used to link the product to its associated product offering.

4.2.2.2   Characteristic Value

Product Characteristics are defined as templates. They often require a value to be specified or selected from an enumeration. A Characteristic Value is used to specify the selected value. Together they uniquely identify a product.

Element	Description	Required
Value	The value specified or selected for the characteristic.	Required if there are no Characteristic Specification Value instances or the value is chosen from a range of values.
Characteristic	Refers to the characteristic value that is specified.	Required.
Characteristic Value	Refers the characteristic value that is being referred.	Optional. Required if no characteristic value instances are available for the specification.

Figure 12 – Characteristic Value - Elements & Description (SID)

4.2.3   Application of Product Definitions

This section summarises the benefits of using product definitions, and outlines the possible modes that can be used.

Party	Benefits
Access Seeker	• Allows stable and reusable business applications to be built that are more resilient to change. • Reduces integration effort for new products.
Access Provider	• Establishes a uniform way of describing a product. • Allows the internal reuse of characteristics to define new products.

It is intended that a machine that reads the schema is able to handle any product description, as the same set of elements, attributes and rules will be used regardless of product. The rich semantic support and consistent use opens up a raft of integration options to access that are more resilient to change and product updates. For example:

1. Construction of web portals that can read the product definitions and render screens on run time by interpreting the semantics.

2. Integrate fulfillment operations into Access Seeker product catalogues (where the NBN Co Services are modeled as resources and combined with other Access Seeker resources and configurations as value added services of the Access Seeker).

4.3   Product Definition - Versioning

Product definitions and their subparts have distinct versioning implications for Access Seekers and NBN Co. NBN Co will be in maintaining versioning of the granular subparts of a product definition. However, for Access Seeker the most granular versioned element would be the product definition itself. It is critical that the B2B and NBN Co systems implementation be able to decouple the above and be able to maintain them independently. (For example, version or systems changes within NBN Co should not necessitate changes to touch points exposed in the B2B).
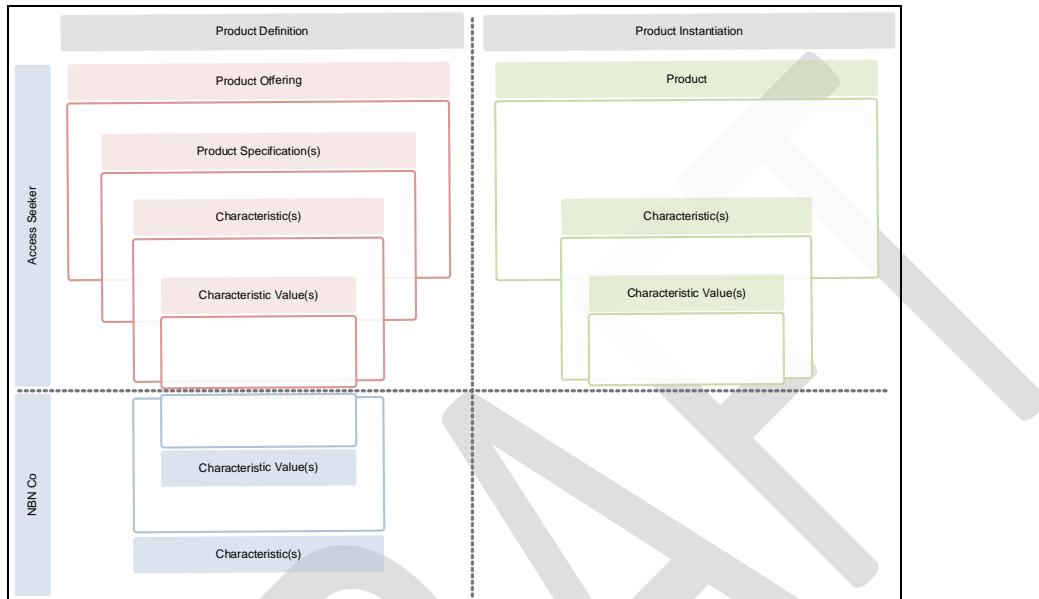

Figure 13 – Product Definition - Versioning Overview

For Access Seekers, the lowest possible versioning element will be a product offering. There will be no additional benefit in specifying Access Seekers with versions at a product specification level or below. A major and minor version number will be used within a **product definition** to manage changes in the following way:

1. All new **minor** versions will be backwards compatible.
   - A minor version change will mostly be used to indicate minor changes in a product offering. It does not necessitate changes to the access seeker systems that are already integrated with the older (minor) version – however some changes might be required if the new features exposed are to be used.

   - E.g. Addition of a new product feature that is optional to use or underlying system change that is transparent to access seeker (however still notified as a minor version update).

2. All new **major** versions will not be backwards compatible.
   - A major version change will not guarantee that changes are not required by the access seeker. It would require attention or reconfiguration by the access seeker.

   - E.g. Addition of a mandatory product feature, removal of a product feature

Note: It is also conceivable that major updates will lead to a new product being offered.

Conversely, *Internal NBN Co systems* implementations require more granular versioning. This is to ensure that reusable sets of characteristics are available to specify product offerings, that is, different versions of a product offering should not lead to its own disconnected characteristics being maintained.

For example, bandwidth is a characteristic type that will be reused across products. The bandwidth selected for a product instance needs to be described using a single data type internally. However, the bandwidth options made available through product offerings and specifications can change from product to product. Therefore, the internal representation of the bandwidth characteristic should contain all possible values by the NBN Co systems implementation and network. Characteristic specifications should be formed not directly with the internal characteristics, but as overrides of the internal characteristics.

5 Appendices

5.1 Appendix A – Product Definition Schema

The embedded document contains the current product definition schema developed by NBN Co.

Important: This is currently under review and subject to change. As such, this should be used as a guide only.

ManageProductCatalogue v1.01.xsd

5.2 Appendix B – Product Definition Sample

The embedded document contains a sample UNI Type product characteristic shown.

Important: This is not a complete or valid NBN Co product. It is intended as a sample to demonstrate how product characteristics can be described. A more complete example including product specification of the sample product will be available during the next release of this document.

This is currently under review and subject to change. As such, this should be used as a guide only.

SampleSpefication.xml
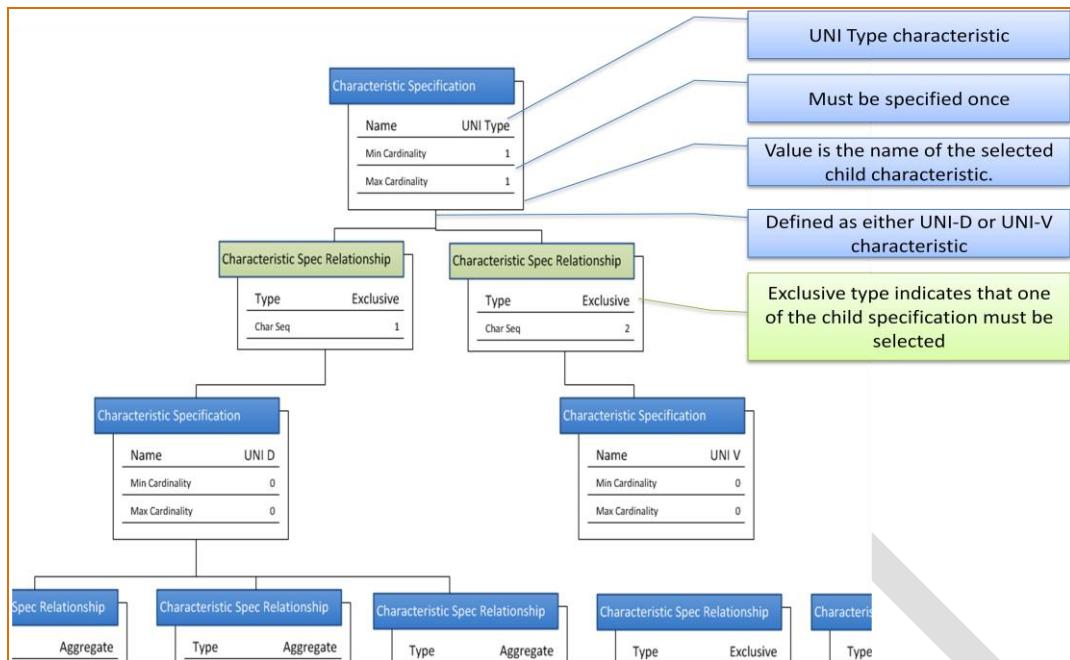
Figure 14 – Product Definition Sample - UNI Type Exclusive Relationship
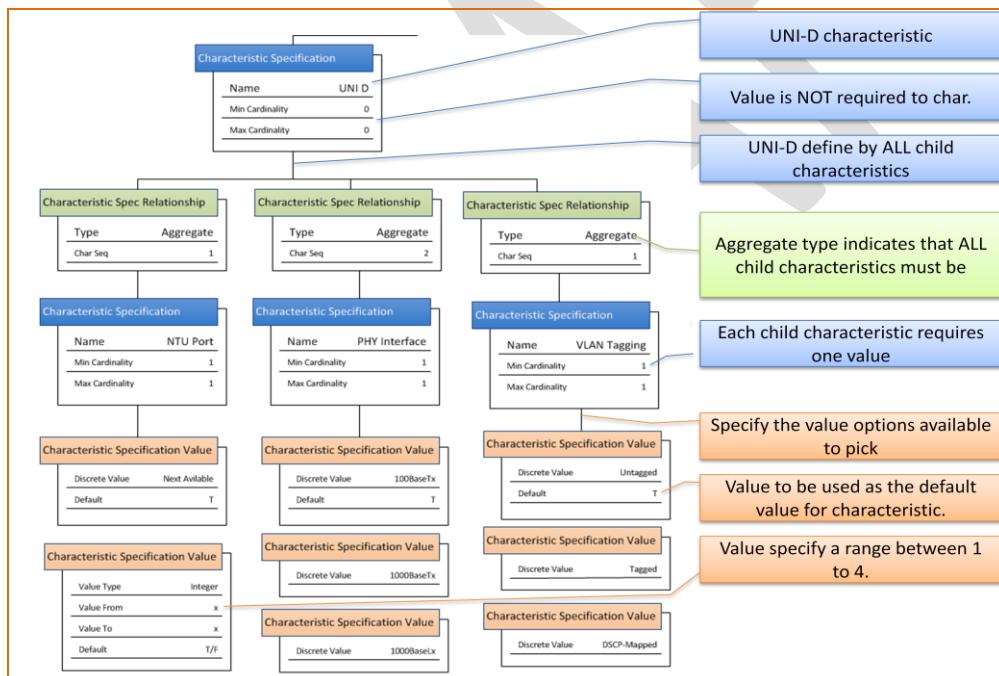
Figure 15 – Product Definition Sample - UNI-D Characteristic

5.3 Appendix C – Product Order Sample

The embedded document contains a sample product order for the sample NBN Co Data product described in 3.1.

Important: This is currently under review and subject to change. As such, this should be used as a guide only.

ManageProductOrder.Request.Template.003.v1.1.xml

Appendix D – Product Order Schema

The embedded document contains the current product order schema developed by NBN Co.

Important: This is currently under review and subject to change   As such, this should be used as a guide only.

ManageProductOrder.xsd

5.4 Appendix E – Key Terms

Link to corporate glossary: http://intranet.nbnco.local/docs/DOC-1050

Term	Description
Access Seeker/s	The term to refer jointly to Retail Service Providers (RSPs) and Wholesale Service Providers (WSPs).
	All entities that connect a Message Service Handler (MSH) to the NBN Co gateway in order to transact with NBN Co.
AS	Access Seekers
Assurance	The functional area that performs assurance for Services and Resources and covers performance management, incident management and alarming
AVC or Access VC	Access Virtual Circuit a logical Ethernet Virtual Circuit that connects the User Network Interface to an Aggregation Point.
B2B	Business-to-Business
B2B_Admin	The section of NBN Co that is responsible for the management of Access Seekers on the NBN Co B2B system.
Billing	Refers to activities related to charging access seekers for NBN Co product use.
Cardinality	A business rule specifying how many times (minimum and maximum) and entity can be related to another entity in a given relationship.
CIM	NBN Co Common Information Model
CIR	Committed Information Rate
	Defines a level of data throughput for which service frames are delivered according to the performance objectives of their Traffic Class.
Communications Alliance	Communications Alliance is the peak body for the Australian communications industry - forging a unified voice for its members in public policy, facilitating industry solutions to industry issues and providing up-to-date information on industry issues.
Complex Type	A characteristic that is defined by a set of child characteristics.
CVC or Connectivity VC	Connectivity Virtual Circuit a logical Ethernet Virtual Circuit that connects Aggregation Points of Fibre Serving Areas to a Point Of Interconnect.
CS/CV	Characteristic Specification / Characteristic Value (CS/CV)
C-TAG	Tagging structure for Virtual Local Area Network (VLAN) addressing scheme as specified in IEEE802.1ad
CVC	Connectivity Virtual Circuits
	A shared Ethernet Virtual Circuit that aggregates one or more Access Virtual Circuits in a Connectivity Serving Area to a Network-Network Interface
Deep dives	In depth reviews conducted by NBN Co with Access Seekers.
DSCP	Differentiated Service Code Point
DHCP	Dynamic Host Control Protocol is a method for automating the assignment of IP addresses and other networking information

Term	Description
Enumeration	A characteristic that is defined by a set of options of which one can be picked. Each option is itself a characteristic.
ES/E	Entity Specification / Entity
Fulfilment	Refers to the activation operations followed in order to configure a service requested by an Order.
ICF domain	Refers to the Integration and Core Flow domain within NBN Co systems.
Industry Interface Concept / Model	This model requires a product to be defined by the data requirements as well as the exposed processes relating to the 'Fulfilment', 'Assurance' and 'Billing' of the product.
Instantiation	Refers to creating an instance following a template.
IP	Internet Protocol
Key	A basic characteristic that identifies a value. A key defines a known entity.
Key Value	A characteristic represents an entity that requires a value.
L2C	Lead to Cash is a stage in the NBN Co End-to-End Business Model.
Link	Ability to link a characteristic to another, where the characteristic type identifies use of the child characteristic.
MOLI	Main Order Line Item
Multiplicity	A characteristic that defines cardinality rules.
NBN Co	The provider of the B2B Gateway and related infrastructure, NBN Co is responsible for administration, support, maintenance and future planning.
NBN Co Vendors	Parties selected to deliver NBN Co IT systems and capability.
NNI	Network to Network Interface as described by the Metro Ethernet Forum.
NTU	Network Terminating Unit. A generic term for network equipment at the End-user premises which provides a point for network demarcation.
NTU Port Id	Refers to the identification number associated with a port on the NTU.
NFAS	NBN Co Fibre Access Service
OAM	Operations, administration and Maintenance
OLI	Order Line Item
PHY Duplex	Refers to the ability to communicate simultaneously in both directions of the physical layer.
PHY	PHY is an abbreviation for the physical layer of the OSI model.
Product Definition	Refers to XML that describes the product in a machine interpretable manner.
Product Instance	Refers to an order for a product being placed. It filled out using product definition template and where specific values have been selected by the access seeker.
Product Specification	Refers to a component of an overall product that is being described.

Term	Description
RSP	Retail Service Providers –referred to as Access Seekers.
SID	Shared Information Data (SID) information model Product Definition
SLA	Service Level Agreement. A formal negotiated agreement between two parties, sometimes referred to as service level guarantee. It is a contract (or part of one) that exists between the Service Provider (NBN Co) and the Customer (Access Seeker), designed to create a common understanding about services, priorities, responsibilities, etc.
T2R	Trouble to Resolve is a stage in the NBN Co End-to-End Business Model.
TM Forum	Tele-Management Forum
Traffic Class	A traffic class is a system-wide collection of buffers, queues, and bandwidth that you can allocate to provide a defined level of service.
Tx	Refers to transmission speed.
UNI	User Network Interface: The physical End-user NFAS access point and NFAS point of network demarcation – either an Ethernet connector or analogue voice connection.
UNI-D	User Network Interface - Data
UNI-V	User Network Interface - Voice
Validation	A validation rule described along with a key-value characteristic
VLAN	Virtual LAN A network architecture which allows geographically distributed users to communicate as if they were on a single physical LAN by sharing a single broadcast and multicast domain
VLAN Tagging	VLAN tagging implementation enables partitioning of traffic in a network using multiple VLANS.
XML	Extensible Markup Language
XSD	XML Schema Definition

6 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
18/1/2011	V0.8	Guy Liyanage	Public draft for comment	Roger Venning

Approvers

This section lists the individuals who need to approve this document before the project can proceed to the next stage.

Approvers are responsible for ensuring that the document content has undergone all the relevant reviews and is complete and accurate, or accept any risks inherent in not having content reviewed prior to approval.

Once approved the content of this document will be baselined and any changes that will impact the scope, time, cost or resources of the project will need to be requested via the Change Management Process.

Date	Version	Name	Organisational Role	Project Role	Signature
18/01/2011	V0.12	Roger Venning	Manager - Integration and Architecture	Overall design	*Insert approval email*