

# **DSL Forum**

## **Technical Report**

### **TR-054**

**(Formerly WT-074v1)**

*Updates and supercedes TR-038*

# **DSL Service Flow-Through Fulfillment Management Overview**

**August 2002**

**Abstract:**

This Working Text defines the first set of several information flows that enable automation of the DSL service business-to-business interfaces between various business entities involved in providing DSL service. The changes reflected herein were required for consistency with WT-063 which is currently in Letter Ballot. Minor formatting and grammatical changes are also included but are not highlighted. If approved as a Technical Report, WT-074 would supercede TR-038.

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# Table of Contents

<b>1. INTRODUCTION</b> .....	<b>8</b>
<b>2. SCOPE</b> .....	<b>11</b>
<b>3. PROTOCOL LAYERS FOR DATA</b> .....	<b>12</b>
<b>4. INTERACTION MODELS</b> .....	<b>14</b>
4.1 SERVICE FULFILLMENT .....	14
4.1.1 <i>Pre-Order</i> .....	16
4.1.1.1 Validate DSL Service Location .....	16
4.1.1.2 Determine Loop Provider.....	16
4.1.2 <i>Prequalification</i> .....	16
4.1.2.1 Determine DSL Capability.....	17
4.1.2.2 Determine RBN Connectivity.....	17
4.1.2.3 Determine Available Broadband Service .....	18
4.1.2.4 Determine Available Network Service.....	18
4.1.2.5 Determine Available Customer Access Transport Service .....	18
4.1.2.6 Determine Available RBN Transport Service .....	19
4.1.2.7 Determine Available Physical DSL Service.....	19
4.1.2.8 Determine Available Loop Service.....	19
4.1.2.9 Determine Compatible CPE.....	20
4.1.3 <i>New Service</i> .....	20
4.1.3.1 Order Broadband Service.....	20
4.1.3.2 Order Network Service.....	21
4.1.3.3 Order Customer Access Transport Service .....	21
4.1.3.4 Order RBN Transport Service.....	22
4.1.3.5 Order Physical DSL Service.....	22
4.1.3.6 Order Loop.....	23
4.1.3.7 Order CPE .....	23
4.1.3.8 Order Installation .....	24

4.1.4 <i>Modify Pending Order</i> .....	24
4.1.4.1 Change Broadband Service Order.....	25
4.1.4.2 Change Loop Order.....	25
4.1.5 <i>Cancel Order</i> .....	25
4.1.5.1 Cancel Broadband Service Order.....	26
4.1.5.2 Cancel RBN Transport Service Order.....	26
4.1.5.3 Cancel Physical DSL Service Order.....	26
4.1.5.4 Cancel Loop Order.....	27
4.1.5.5 Cancel CPE Order.....	27
4.1.5.6 Cancel Installation Order.....	27
4.1.6 <i>Change Service</i> .....	28
4.1.6.1 Change Broadband Service.....	28
4.1.6.2 Change Network Service.....	28
4.1.6.3 Change Customer Access Transport Service.....	29
4.1.6.4 Change RBN Transport Service.....	29
4.1.6.5 Change Physical DSL Service .....	29
4.1.6.6 Change Loop.....	30
4.1.7 <i>Disconnect Service</i> .....	30
4.1.7.1 Disconnect Broadband Service .....	30
4.1.7.2 Disconnect Network Service.....	31
4.1.7.3 Disconnect Customer Access Transport Service.....	31
4.1.7.4 Disconnect RBN Transport Service .....	31
4.1.7.5 Disconnect Physical DSL Service.....	32
4.1.7.6 Disconnect Loop.....	32
4.1.7.7 Disconnect CPE.....	32
4.1.7.8 Disconnect Installation .....	33
4.1.8 <i>Suspend Service</i> .....	33
4.1.8.1 Suspend Broadband Service.....	33
4.1.8.2 Suspend Network Service.....	33
4.1.8.3 Suspend Customer Access Transport Service.....	34
4.1.8.4 Suspend RBN Transport Service .....	34

4.1.9 Resume Service .....	34
4.1.9.1 Resume Broadband Service .....	35
4.1.9.2 Resume Network Service .....	35
4.1.9.3 Resume Customer Access Transport Service .....	35
4.1.9.4 Resume RBN Transport Service .....	36
4.1.10 Service Configuration .....	36
4.1.10.1 Broadband Service Configuration .....	36
4.1.10.2 Network Service Configuration .....	37
4.1.10.3 Customer Access Transport Service Configuration .....	37
4.1.10.4 RBN Transport Service Configuration .....	37
4.1.10.5 Physical DSL Service Configuration .....	38
4.1.10.6 Loop Configuration .....	38
4.1.10.7 CPE Configuration .....	39
<b>5. GLOSSARY AND REFERENCES .....</b>	<b>40</b>
5.1 GLOSSARY OF TERMS, ACRONYMS AND TERMINOLOGY .....	40
5.1.1 Customer Premises (CP) .....	40
5.1.1.1 Customer Premises Equipment (CPE) .....	40
5.1.1.2 Customer Located Equipment (CLE) .....	40
5.1.2 Loop Provider (LP) .....	40
5.1.3 Access Provider (AP) .....	40
5.1.4 Regional Network Provider (RNP) .....	40
5.1.5 Service Provider (SP) .....	41
5.1.6 Service Level Agreement (SLA) .....	41
5.1.7 Reference Points .....	41
5.1.7.1 A11 Reference Point .....	41
5.1.7.2 A10 Reference Point .....	42
5.1.7.3 V Reference Point .....	42
5.1.7.4 U Reference Point .....	42
5.1.7.5 T Reference Point .....	42
5.1.7.6 S Reference Point .....	42

5.2 REFERENCES.....	42
<b>APPENDIX A SEQUENCE DIAGRAMS.....</b>	<b>44</b>
SERVICE FULFILLMENT: PRE-ORDER 4.1.1.1_1.....	44
SERVICE FULFILLMENT: PRE-ORDER 4.1.1.1_2.....	45
SERVICE FULFILLMENT: PRE-ORDER 4.1.1.2_1.....	46
SERVICE FULFILLMENT: PRE-ORDER 4.1.1.2_2.....	47
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.1_1.....	48
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.1_2.....	49
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.1_3.....	50
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.1_4.....	51
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.1_5.....	52
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.1_6.....	53
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.2_1.....	54
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.3_1.....	55
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.4_1.....	56
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.4_2.....	57
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.5_1.....	58
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.5_2.....	59
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.6_1.....	60
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.7_1.....	61
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.8_1.....	62
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.9_1.....	63
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.9_2.....	64
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.9_3.....	65
SERVICE FULFILLMENT: PREQUALIFICATION 4.1.2.9_4.....	66
SERVICE FULFILLMENT: NEW SERVICE 4.1.3.1_1.....	67
SERVICE FULFILLMENT: NEW SERVICE 4.1.3.1_1.....	68
SERVICE FULFILLMENT: NEW SERVICE 4.1.3.2_2.....	69
SERVICE FULFILLMENT: NEW SERVICE 4.1.3.2_3.....	70

SERVICE FULFILLMENT: NEW SERVICE	4.1.3.2_4	71
SERVICE FULFILLMENT: NEW SERVICE	4.1.3.3_1	72
SERVICE FULFILLMENT: NEW SERVICE	4.1.3.4_1	73
SERVICE FULFILLMENT: NEW SERVICE	4.1.3.5_1	74
SERVICE FULFILLMENT: NEW SERVICE	4.1.3.6_1	75
SERVICE FULFILLMENT: NEW SERVICE	4.1.3.7_1	76
SERVICE FULFILLMENT: NEW SERVICE	4.1.3.7_2	77
SERVICE FULFILLMENT: NEW SERVICE	4.1.3.8_1	78
SERVICE FULFILLMENT: NEW SERVICE	4.1.3.8_2	79
SERVICE FULFILLMENT: MODIFY PENDING ORDER	4.1.4.1_1	80
SERVICE FULFILLMENT: MODIFY PENDING ORDER	4.1.4.2_1	81
SERVICE FULFILLMENT: CANCEL ORDER	4.1.5.1_1	82
SERVICE FULFILLMENT: CANCEL ORDER	4.1.5.2_1	83
SERVICE FULFILLMENT: CANCEL ORDER	4.1.5.3_1	84
SERVICE FULFILLMENT: CANCEL ORDER	4.1.5.4_1	85
SERVICE FULFILLMENT: CANCEL ORDER	4.1.5.5_1	86
SERVICE FULFILLMENT: CANCEL ORDER	4.1.5.5_2	87
SERVICE FULFILLMENT: CANCEL ORDER	4.1.5.6_1	88
SERVICE FULFILLMENT: CANCEL ORDER	4.1.5.6_2	89
SERVICE FULFILLMENT: CHANGE SERVICE	4.1.6.1_1	90
SERVICE FULFILLMENT: CHANGE SERVICE	4.1.6.2_1	91
SERVICE FULFILLMENT: CHANGE SERVICE	4.1.6.2_2	92
SERVICE FULFILLMENT: CHANGE SERVICE	4.1.6.3_1	93
SERVICE FULFILLMENT: CHANGE SERVICE	4.1.6.4_1	94
SERVICE FULFILLMENT: CHANGE SERVICE	4.1.6.5_1	95
SERVICE FULFILLMENT: CHANGE SERVICE	4.1.6.6_1	96
SERVICE FULFILLMENT: DISCONNECT SERVICE	4.1.7.1_1	97
SERVICE FULFILLMENT: DISCONNECT SERVICE	4.1.7.2_1	98
SERVICE FULFILLMENT: DISCONNECT SERVICE	4.1.7.2_2	99

SERVICE FULFILLMENT: DISCONNECT SERVICE	4.1.7.3_1	100
SERVICE FULFILLMENT: DISCONNECT SERVICE	4.1.7.4_1	101
SERVICE FULFILLMENT: DISCONNECT SERVICE	4.1.7.5_1	102
SERVICE FULFILLMENT: DISCONNECT SERVICE	4.1.7.6_1	103
SERVICE FULFILLMENT: DISCONNECT SERVICE	4.1.7.7_1	104
SERVICE FULFILLMENT: DISCONNECT SERVICE	4.1.7.7_2	105
SERVICE FULFILLMENT: DISCONNECT SERVICE	4.1.7.8_1	106
SERVICE FULFILLMENT: DISCONNECT SERVICE	4.1.7.8_2	107
SERVICE FULFILLMENT: SUSPEND SERVICE	4.1.8.1_1	108
SERVICE FULFILLMENT: SUSPEND SERVICE	4.1.8.2_1	109
SERVICE FULFILLMENT: SUSPEND SERVICE	4.1.8.2_2	110
SERVICE FULFILLMENT: SUSPEND SERVICE	4.1.8.3_1	111
SERVICE FULFILLMENT: SUSPEND SERVICE	4.1.8.4_1	112
SERVICE FULFILLMENT: RESUME SERVICE	4.1.9.1_1	113
SERVICE FULFILLMENT: RESUME SERVICE	4.1.9.2_1	114
SERVICE FULFILLMENT: RESUME SERVICE	4.1.9.2_2	115
SERVICE FULFILLMENT: RESUME SERVICE	4.1.9.3_1	116
SERVICE FULFILLMENT: RESUME SERVICE	4.1.9.4_1	117
SERVICE FULFILLMENT: SERVICE CONFIGURATION	4.1.10.1_1	118
SERVICE FULFILLMENT: SERVICE CONFIGURATION	4.1.10.2_1	119
SERVICE FULFILLMENT: SERVICE CONFIGURATION	4.1.10.2_1	120
SERVICE FULFILLMENT: SERVICE CONFIGURATION	4.1.10.3_1	121
SERVICE FULFILLMENT: SERVICE CONFIGURATION	4.1.10.4_1	122
SERVICE FULFILLMENT: SERVICE CONFIGURATION	4.1.10.5_1	123
SERVICE FULFILLMENT: SERVICE CONFIGURATION	4.1.10.6_1	124
SERVICE FULFILLMENT: SERVICE CONFIGURATION	4.1.10.7_1	125

# 1. INTRODUCTION

In the DSL Service supply chain, standardized flow-through end-to-end interactions between various trading partners do not exist. This lack of standards creates problems in the execution of the following major business processes:

- Service Fulfillment
- Service Assurance
- Billing

The Service Fulfillment function involves the activities of determining whether service can be provided, and managing the ordering processes for the service.

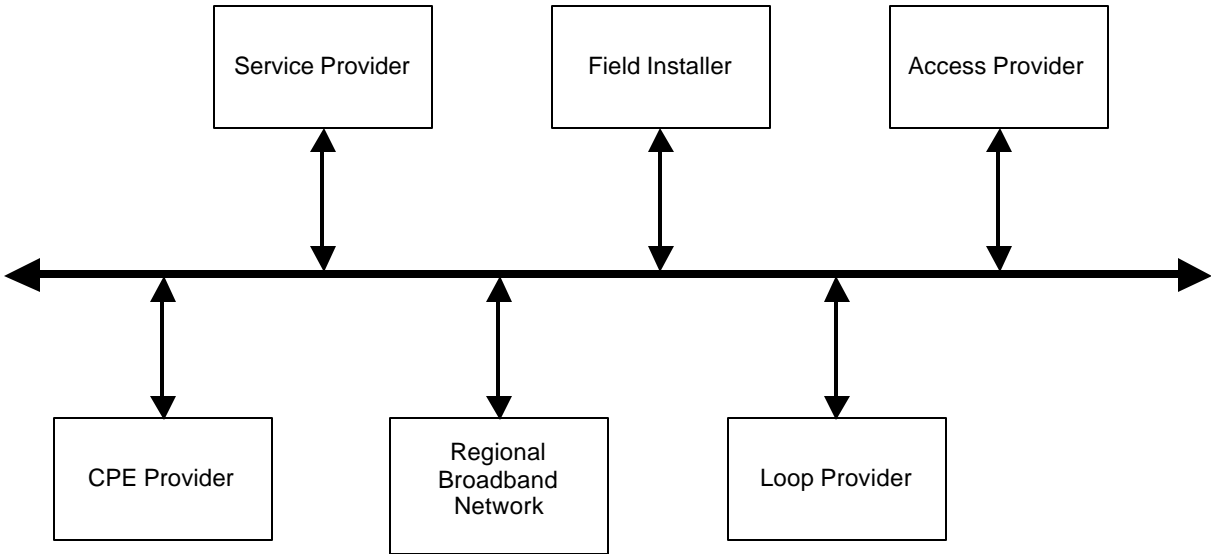
The Service Assurance function includes the activities of Fault Management and Performance Management of in-service Services.

The Billing function includes the activities of tracking, rating and invoicing the end user for the service.

The problems created by the lack of standards include:

1. Labor intensive processes and their associated time and costs.
2. Error-prone hand-offs of information between operational entities.
3. Delays in provisioning cycles.
4. Low levels of service assurance.
5. Lack of billing synchronization.
6. Multiple proprietary solutions.
7. Lack of visibility into partner systems and networks.

Figure 1 represents the operational entities in the prototypical DSL service supply chain:



**Figure 1: Generic DSL Service Supply Chain Interactions**



The *Loop Provider* is the entity which:

- provides a metallic loop from the access network equipment to the customer's premises,
- is responsible for the integrity of the metallic loop and its repair.

The *Access Provider* is the entity which:

- provides digital connectivity to the customer,
- is responsible for the performance and repair of the access transmission equipment.

Traditionally the Access Provider is the entity that "owns" the DSLAM. An Access Provider may provide multiple simultaneous connections to multiple Regional Broadband Network Providers.

The *Service Provider* is the entity which:

- provides service to the end customer [i.e., End-User],
- is responsible for overall service assurance and, in particular, the aspects of service that are independent of the network between the server and the customer,
- may provide CPE, or software to run on customer-owned CPE, to support a given service.

A Service Provider provides higher-layer application-level services such as voice, video, audio and/or basic Layer-3 access.

It is possible for a Service Provider to interact directly with an Access Provider in certain business process scenarios, such as Pre-Qualification of a loop.

The *Regional Broadband Network (RBN) Provider* is the entity which:

- provides appropriate connectivity between the Access Provider and the Service Provider
- is responsible for regional network performance and repair.

TR-025 states that the RBN does/may do the following functions:

- Provide service provisioning and backbone bandwidth allocation.
- May provide aggregation of PPP traffic.
- May provide signaling and service interworking.
- May provide proxy Authentication, Accounting, Addressing and Authorization.

The *CPE Provider* is the entity which supplies the customer premise equipment.

The *Field Installer* is the entity which performs the function of installing equipment and/or configuring equipment/software at the end user's premises. The Field Installer entity may be the end-user customer performing self-install, or it may be auto-configuration performed via software. No attempt is made in this document to describe all possible scenarios. The document only addresses what information is necessary to complete the Field Installer functions.

Figure 2 illustrates the typical network architecture for supporting DSL service to an end-user's premises.

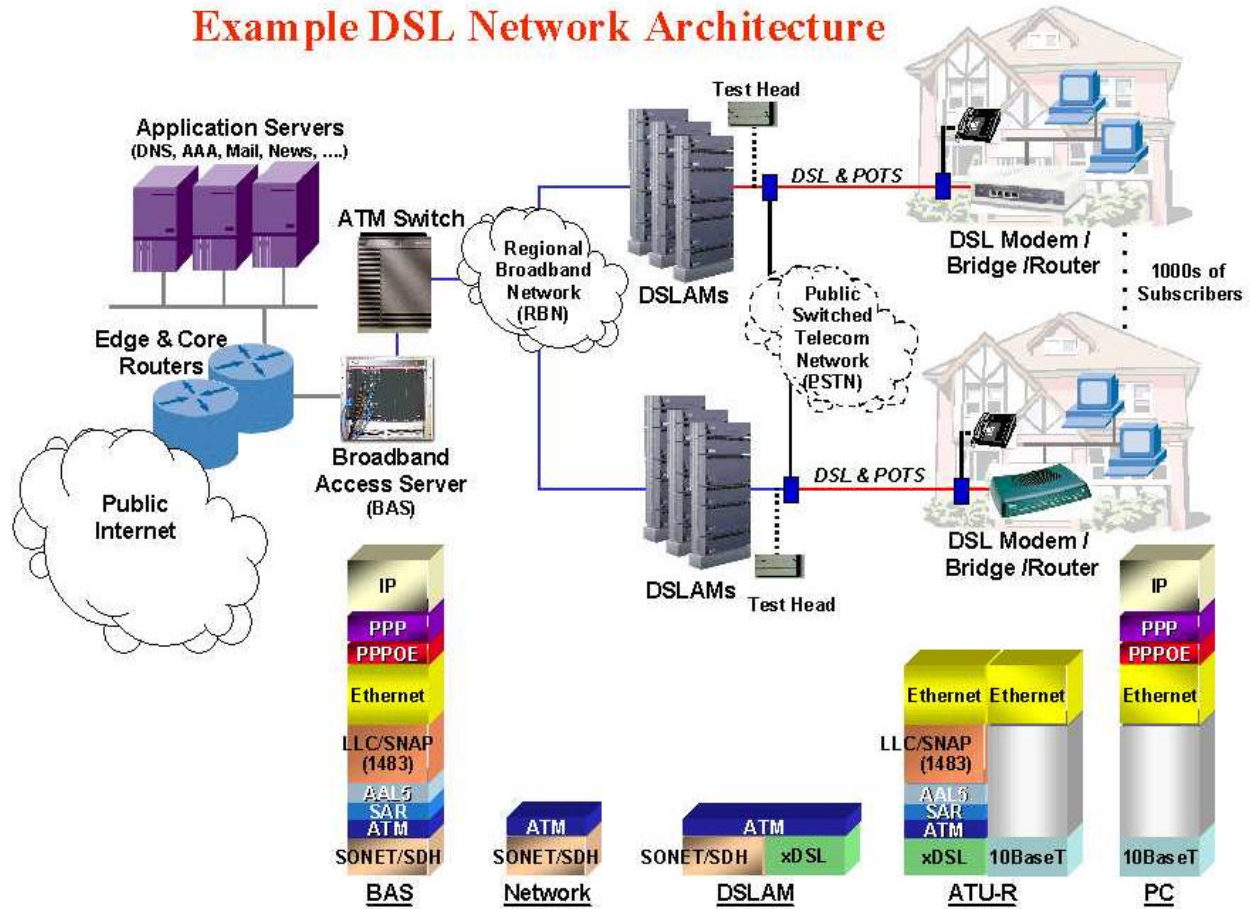


Figure 2: Typical DSL Network Architecture

## 2. SCOPE

This Working Text recommends a normalized set of interactions that enable the automation of Service Fulfillment business processes between the operational entities which cooperate to provide the end-to-end DSL service. This document addresses the Service Fulfillment activities necessary to provide *data* services only.

This recommendation is extensible to support interactions for Service Assurance and Billing, value-added services such as VoDSL, and management of other forms of broadband access.

### **3. PROTOCOL LAYERS FOR DATA**

For Service Fulfillment, use cases are identified to manipulate service definitions at each Layer of the protocol stack. The diagrams below (Figure 3 and Figure 4) illustrate the protocol Layers associated with establishing end-to-end DSL service for Data.

#### **Layer 1 – Physical**

This layer is concerned with the establishment and removal of a physical circuit between two adjacent communicating devices. ADSL is an example of a physical layer, and the specification of wire gauge, span lengths, acceptable total bridge tap length, transmitter levels, and modulation techniques, are all examples of things that are specified at this level. The physical layer may also make provisions for monitoring and reporting certain parameters, such as bit error rates or failures via a management system.

#### **Layer 2 – Data Link**

The link layer provides for reliable transport of data over the physical layer between two adjacent communicating devices. Protocols at this level are concerned with ordering and formatting data into identifiable frames, maintaining timing and synchronization between the ends of the link, detecting errors, and providing addressing to guide the frame to the appropriate link layer destination. Flow control is also provided at this layer so a source cannot overwhelm the device on the other end of the link with data.

#### **Layer 2.5 - Adaptation**

The adaptation layer provides configuration for the type of adaptation used for the transport.

#### **Layer 3 – Network**

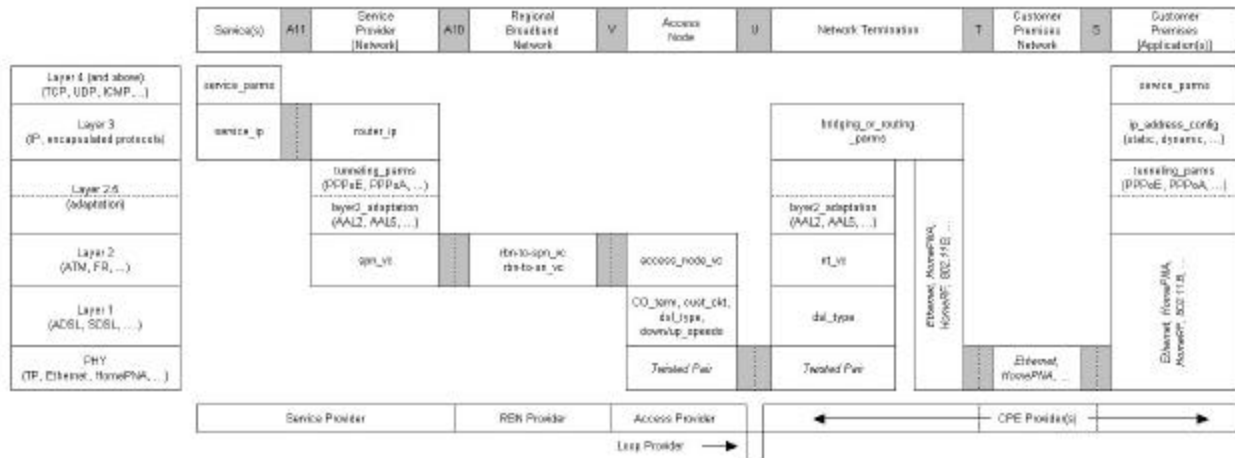
The network layer is primarily concerned with routing data throughout an overall network, the Internet for example. Using a destination address built into the header of a network layer packet, devices in the network, typically routers or packet switches, relay the packet from source to destination.

#### **Layer 4 – Transport**

End-to-end communication is the responsibility of the transport layer. Higher layer information (which may be a continuous stream of data) is broken down into manageable chunks here for Layer Three. Layer Four also numbers these packets in sequence created.

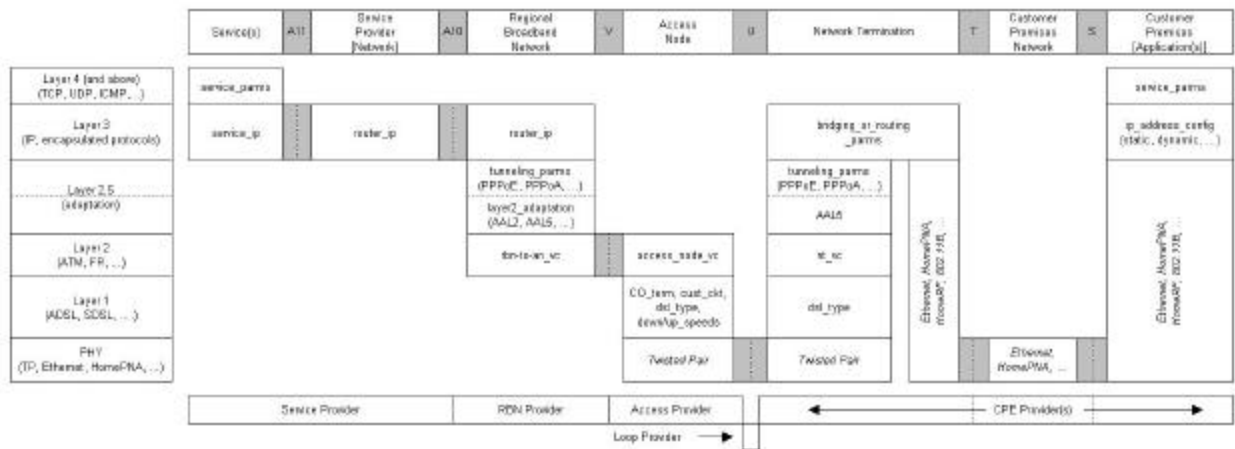
Layer Three is a "best effort" service, and a packet delivered to Layer Three by Layer Four may be lost in the network or delayed, and arrive after later packets were sent. Layer Four is responsible for reordering packets and requesting retransmission of lost packets. Layer Four also provides end-to-end flow control.

Figure 3 illustrates the protocol layering for an example DSL network configuration in which the Regional Broadband Network provides Layer 2 transport between Access Provider and Service Provider. In this example, the PPP session is between client software residing in a customer's host system and a Service Provider's Broadband Access Server.



**Figure 3: Protocol Layers for Data**

Figure 4 illustrates an example DSL network configuration where the Regional Broadband Network provides aggregation service and Layer 3 transport to the Service Provider. In this example, Layer 2 from Access Provider stops at RBN provider and the PPP session is between client software residing in a customer's Network Termination (NT) and a Regional Broadband Network Provider's Broadband Access Server.



**Figure 4: Protocol Layers for Data**

## 4. INTERACTION MODELS

This Working Text models the information flow between various operational entities in the DSL Service supply chain as defined above. The model is described as the information content of requests and responses as well as asynchronous notifications between the Service Provider and the Access Provider (possibly through a Regional Broadband Network Provider) for the high-level process of Service Fulfillment.

An interaction may consist of a pair of request and response interactions between two entities (described in Figure 1) and/or as one or more unsolicited notifications from one entity to another. The relevant entities that participate in a given interaction model are called Actors, which are further classified as "Requestors," "Responders," or "Notifiers." The actual actor role of an entity in a given interaction is determined from the context of that model. Note that the Actors described in the use cases are prototypical, but not exclusive for each case.

The interaction between the entities is modeled as a request or a response or a notification, and can be achieved by some means of communication between the two (such as e-mail, phone, fax, EDI interchange, XML interaction over the Internet, etc.).

The model is documented via Sequence Diagrams, using the Unified Modeling Language (UML). The Sequence Diagrams are contained in Appendix A.

### 4.1 Service Fulfillment

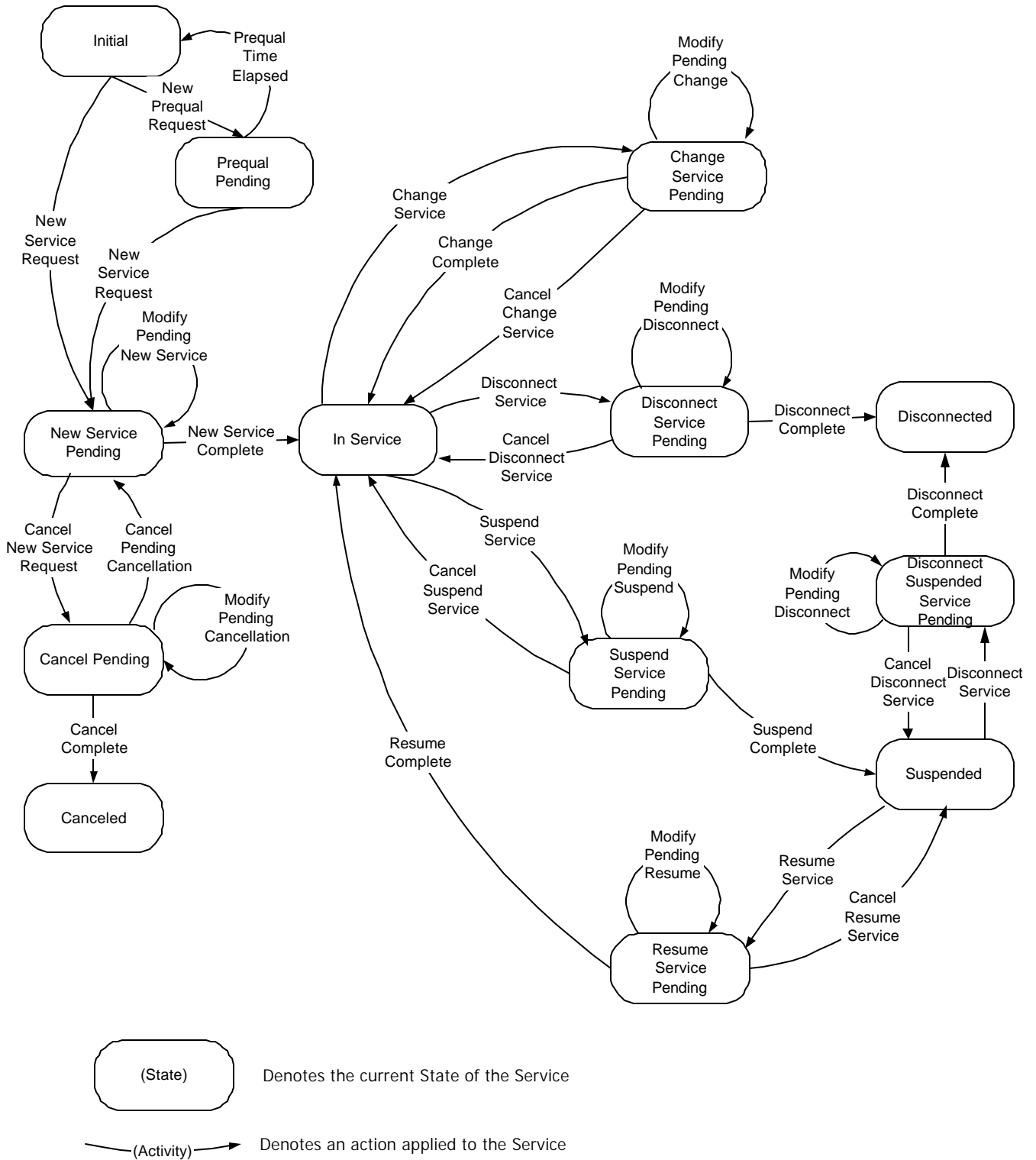
The Service Fulfillment function involves the activities of determining whether service can be provided, and managing the ordering processes for the service.

Service Fulfillment is involved with the entire life-cycle of the service, including the ordering required to establish the service, and any subsequent ordering to modify or disconnect the service.

Figure 5 depicts the valid states of a Service, along with the activities which cause the Service to transition between states.

All Order Activities are included in the state transition diagram. The PreOrder activities are not included, as they do not affect the status of a Service. Prequalification is included as an optional activity prior to the "New Service Pending" state.

A request or the completion of a request causes the transition from one state to the next. Not all requests cause a state transition, as illustrated by the activities which denote remaining in the same state. For example, when a service is in the "Change Service Pending" state, a request may be received to modify the original Change Service Request. (Consider the case where a request is received to change the due date of the original Change Service Request.) The request is valid, and it is processed, however the service remains in the "Change Service Pending" state.



**Figure 5: Service State Diagram**

### **4.1.1 Pre-Order**

The Pre-order activities are performed by a partner to gather information in preparation for Prequalification or the placement of a New Order.

Initiating Event: Request for DSL serviceability.

#### **4.1.1.1 Validate DSL Service Location**

Actors:

Requestor – Access Provider, Service Provider, RBN Provider

Responder – Access Provider, RBN Provider, Loop Provider

This use case is used to validate the location of the requested DSL service, by address and/or telephone number and/or circuit id. This use case applies to Layer 1 only. The responder may return a confirmation of the valid location or a list of near-matches, if any.

This is typically considered as an Address Validation activity.

This use case is implemented via a pair of messages:

Validate DSL Service Location Request

Validate DSL Service Location Response

#### **4.1.1.2 Determine Loop Provider**

Actors:

Requestor – Access Provider, Service Provider, RBN Provider

Responder – Access Provider, RBN Provider, Loop Provider

This use case is used to determine the Loop Provider at a specified location. This use case applies to Layer 1 only. The responder may return identity of the Loop Provider, if known.

This use case is implemented via a pair of messages:

Determine Loop Provider Request

Determine Loop Provider Response

### **4.1.2 Prequalification**

The Prequalification activities are used to determine whether service can be provided at a particular location, and to characterize the type of service which can be offered.

Initiating Event: Request for DSL serviceability.



#### 4.1.2.1 Determine DSL Capability

Actors:

Requestor – Access Provider, Service Provider, RBN Provider, Loop Provider

Responder – Access Provider, Loop Provider, RBN Provider

This use case is used to determine the capability of a partner to provide DSL to a requested location, where location can be a specific service address, a range of addresses, or a geographic region. This use case applies to Layer 1 only. The responder may return an indication as to whether DSL service is available at the input location, any capacity constraints, an indication of available speed and type of service, the loop location, switch, availability dates, etc.

This use case is implemented via a pair of messages and a notification:

Determine DSL Capability Request

Determine DSL Capability Response

Determine DSL Capability Notification

An alternative implementation of the use case is via an unsolicited notification by a partner to identify a location where DSL capability has changed.

#### 4.1.2.2 Determine RBN Connectivity

Actors:

Requestor – Service Provider, RBN Provider\*

Responder – RBN Provider, Access Provider

This use case is used to determine network connectivity and capacity between partners across the regional broadband network. This use case applies to Layer 2 only. The responder may return virtual circuit information (for PVC model) or the VLAN assignment. Network element assignment information, e.g., ports, may be also returned.

With reference to Figures 3 and 4, this use case is used to determine whether there is connectivity across the network between the A10 and V interfaces.

\*When requestor and responder are both RBN Providers, they are different entities.

This use case is implemented via a pair of messages:

Determine RBN Connectivity Request

Determine RBN Connectivity Response

#### 4.1.2.3 Determine Available Broadband Service

Actors:

Service Provider

This use case is used to determine the availability of broadband services offered by the Service Provider to the end-user customer, at the location, optionally constrained by CPE, desired speed, and/or desired services. This use case applies to Layer 4 (and above).

#### 4.1.2.4 Determine Available Network Service

Actors:

Requestor – Service Provider\*, Access Provider\*\*

Responder – Access Provider, Service Provider

Potential Participant – RBN Provider

This use case is used to determine the availability of network services offered by the partner at the location, optionally constrained by CPE, desired speed, and/or desired services. This use case applies to Layer 3. The responder may return a list of services, associated quality of services, speed, type, service level agreement, availability dates, etc.

\*When requestor and responder are both Service Providers, they are different entities.

\*\*When requestor and responder are both Access Providers, they are different entities.

This use case is implemented via a pair of messages:

Determine Available Network Service Request

Determine Available Network Service Response

#### 4.1.2.5 Determine Available Customer Access Transport Service

Actors:

Requestor – Service Provider, Access Provider\*

Responder – Access Provider

Potential Participant - RBN Provider

This use case is used to determine the availability of customer access transport services offered by the partner, optionally constrained by CPE, desired speed, and/or desired services. This use case can apply to all Layer 2. The responder may return a list of services, associated quality of services, speed, type, service level agreement, availability dates, etc.

This use case is implemented via a pair of messages:

Determine Available Customer Access Transport Service Request

Determine Available Customer Access Transport Service Response

#### **4.1.2.6 Determine Available RBN Transport Service**

Actors:

Requestor – Service Provider  
Responder – Access Provider  
Potential Participant – RBN Provider

This use case is used to determine the availability of RBN transport service offered by the partner at the location, optionally constrained by CPE, desired speed, and/or desired services. This use case applies to Layer 2. The responder may return a list of services, associated quality of services, speed, type, service level agreement, availability dates, etc.

With reference to Figure 3, this use case is used to determine whether there is connectivity across the U to T interface.

This use case is implemented via a pair of messages:

Determine Available RBN Transport Service Request  
Determine Available RBN Transport Service Response

#### **4.1.2.7 Determine Available Physical DSL Service**

Actors:

Requestor – Service Provider  
Responder – Access Provider  
Potential Participants – RBN Provider

This use case is used to determine the availability of physical DSL service offered by the partner at the location, optionally constrained by CPE and/or desired speed. This use case applies to Layer 1. The responder may return a list of services, speed, type, availability dates, etc.

This use case is implemented via a pair of messages:

Determine Available Physical DSL Service Request  
Determine Available Physical DSL Service Response

#### **4.1.2.8 Determine Available Loop Service**

Actors:

Requestor – Access Provider  
Responder – Loop Provider  
Potential Participants – Service Provider, RBN Provider

This use case is used to determine the availability of a DSL-capable loop at the location, optionally constrained by CPE, desired speed, and/or desired services. This use case applies to Layer 1. The responder may return a list of services, associated quality of services, speed, type, service level agreement, availability dates, etc.

This use case is implemented via a pair of messages:

Determine Available Loop Service Request  
Determine Available Loop Service Response

#### 4.1.2.9 Determine Compatible CPE

Actors:

Requestor – Access Provider, Service Provider  
Responder – Access Provider, CPE Provider  
Potential Participant – RBN Provider

This use case is used to determine the CPE or CPEs that can deliver service at a location optionally constrained by desired speed, and/or desired services. This use case can apply to all Layers; i.e., Layers 1-4+. The responder may return with the list of compatible CPEs.

This use case is implemented via a pair of messages:

Determine Compatible CPE Request  
Determine Compatible CPE Response

#### 4.1.3 New Service

The New Service activities involve establishing DSL service at a location.

Initiating Event: Order for DSL and/or services provided over DSL.

Precondition: Service location prequalification

A New Service request must contain at least one of the following sub-items:

##### 4.1.3.1 Order Broadband Service

Precondition: The underlying layers support the requested service.

Actors:

Requestor – end-user customer, Service Provider\*  
Responder – Service Provider  
Notifier – Service Provider

This use case is used to establish broadband service (voice, video, VPN, data, etc.) by a Service Provider for an end-user customer. This use case is also used to query about the status of a Broadband Service order.

There may be more than one Service Provider involved in fulfillment, in the case of a resale scenario. This use case applies to Layer 4 (and above).

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of order request/response messages, a pair of query status request/response messages and a status notification message:

Order Broadband Service Request  
Order Broadband Service Response  
Broadband Service Status Request  
Broadband Service Status Response  
Broadband Service Status Notification

#### 4.1.3.2 Order Network Service

Precondition: CPE specification is known. Broadband service type is known.

Actors:

- Requestor – Service Provider\*
- Responder – Field Installer, Service Provider or none
- Notifier – Field Installer, Service Provider
- Potential Participants – Access Provider, RBN Provider

This use case is used to order network services. This use case is also used to query about the status of an order for network services.

This use case applies to Layer 3. The request includes information about IP assignment, DNS, etc. The response may be an acknowledgement that configuration has been performed.

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of order request/response messages, a pair of query status request/response messages and a status notification message:

- Order Network Service Request
- Order Network Service Response
- Network Service Status Request
- Network Service Status Response
- Network Service Status Notification

#### 4.1.3.3 Order Customer Access Transport Service

Precondition: ATU-C (e.g., DSLAM) identity is known. CPE configuration is known.

Actors:

- Requestor – Service Provider
- Responder – Access Provider
- Notifier – Access Provider

This use case is used to order customer premise transport service, along with SLA requirements, between an Access Provider and the customer premise. This use case is also used to query about the status of a previously placed order for customer access transport service. This use case applies to Layer 2. The responder may return virtual circuit assignments in the response.

This use case is implemented via a pair of order request/response messages, a pair of query status request/response messages and a status notification message:

- Order Customer Access Transport Service Request
- Order Customer Access Transport Service Response
- Customer Access Transport Service Status Request
- Customer Access Transport Service Status Response
- Customer Access Transport Service Status Notification

#### 4.1.3.4 Order RBN Transport Service

Precondition: ATU-C (e.g., DSLAM) identity is known.

Actors:

Requestor – Service Provider, RBN Provider\*  
Responder – RBN Provider, Access Provider  
Notifier – RBN Provider, Access Provider

This use case is used to order RBN transport service, along with SLA requirements, between an Access Provider and a Service Provider, via one or more RBN Providers. It is also used to query about the status of an RBN transport service order.

This use case applies to Layer 2. The requestor must provide originating circuit information.

The responder may return virtual circuit assignments in the response, or in the notification when service has been activated.

\*When requestor and responder are both RBN Providers, they are different entities. As illustrated in Figure 2, there may be multiple RBN providers involved in providing the DSL Service.

This use case is implemented via a pair of order request/response messages, a pair of query status request/response messages and a status notification message:

Order RBN Transport Service Request  
Order RBN Transport Service Response  
RBN Transport Service Status Request  
RBN Transport Service Status Response  
RBN Transport Service Status Notification

#### 4.1.3.5 Order Physical DSL Service

Precondition: Loop identity is known. CPE is compatible.

Actors:

Requestor – Service Provider  
Responder – Access Provider  
Notifier – Access Provider  
Potential Participants – RBN Provider

This use case is used to order the DSL service with specified parameters (type, speed, SLA, etc.), or to query about the status of a previously placed order for DSL service. This use case applies to Layer 1. The responder returns with the ATU-C (e.g., DSLAM) identity and port and may also respond with upstream speed, downstream speed, etc.

This use case is implemented via a pair of order request/response messages, a pair of query status request/response messages and a status notification message:

- Order Physical DSL Service Request
- Order Physical DSL Service Response
- Physical DSL Service Status Request
- Physical DSL Service Status Response
- Physical DSL Service Status Notification

#### **4.1.3.6 Order Loop**

Actors:

- Requestor – Access Provider
- Responder – Loop Provider
- Notifier – Loop Provider
- Potential Participants – Service Provider, RBN Provider

This use case is used to order a DSL-compatible loop, including the access provider's termination information (e.g., CO splitter location, intra-office circuit/channel, or distribution frame cross-connect point). This use case is also used to query about the status of a previously placed order for a loop. This use case applies to Layer 1. The responder returns the loop identity; i.e., Circuit ID, telephone number.

This use case is implemented via a pair of order request/response messages, a pair of query status request/response messages and a status notification message:

- Order Loop Request
- Order Loop Response
- Loop Status Request
- Loop Status Response
- Loop Status Notification

#### **4.1.3.7 Order CPE**

Precondition: none

Actors:

- Requestor – Access Provider, Service Provider
- Responder – CPE Provider
- Notifier – CPE Provider

This use case is used to order CPE hardware or to query about the status of a previously placed order for CPE hardware. This use case is at Layer 1. The responder returns with an acknowledgement which may include a delivery date, and ultimately CPE delivery.

This use case is implemented via a pair of order request/response messages, a pair of query status request/response messages and a status notification message:

- Order CPE Request
- Order CPE Response
- CPE Status Request
- CPE Status Response
- CPE Status Notification

#### **4.1.3.8 Order Installation**

Precondition: CPE delivery date is known. Service activation dates are known.

Actors:

- Requestor – Access Provider, Service Provider
- Responder – Field Installer
- Notifier – Field Installer

This use case is used to schedule customer premise installation and testing; e.g., CPE configuration, inside wiring, NIC installation, etc. This use case is also used to query about the status of a previously scheduled installation. This use case is at Layers 1-4+. The responder may return with an acknowledgement and schedule information.

This use case is implemented via a pair of order request/response messages, a pair of query status request/response messages and a status notification message:

- Order Installation Request
- Order Installation Response
- Installation Status Request
- Installation Status Response
- Installation Status Notification

#### **4.1.4 Modify Pending Order**

The Modify Pending Order activities are used to make changes to an order which is 'in progress'. An order has been placed, and the order is in the process of being fulfilled. The original order could have been a New, Change or Disconnect Service.

The Modify Pending Order is not requesting changes to a Service, but rather to an original 'in-progress' order.

An example would be:

A New Service order is placed, then prior to the order being fulfilled, a Modify Pending Order is placed to make changes to the type of broadband service being requested, or to the due date requested for the service fulfillment.



#### **4.1.4.1 Change Broadband Service Order**

Precondition: If changing service characteristics, the underlying layers support the requested service.

Actors:

Requestor – end-user customer, Service Provider\*  
Responder – Service Provider

This use case is used to change service or fulfillment parameters on a previously placed order. There may be more than one Service Provider involved in fulfillment, in the case of a resale scenario.

\*When requestor and responder are both Service Providers, they are different entities.

This use case applies to Layer 4 (and above).

This use case is implemented via a pair of order request/response messages

Change Broadband Service Order Request  
Change Broadband Service Order Response

#### **4.1.4.2 Change Loop Order**

Actors:

Requestor – Access Provider  
Responder – Loop Provider  
Potential Participants – Service Provider, RBN Provider

This use case is used to modify a previously placed loop order. An example is changing the due date for a requested service.

This use case is implemented via a pair of messages:

Change Loop Order Request  
Change Loop Order Response

#### **4.1.5 Cancel Order**

The Cancel Order activities are used to cancel an order which is 'in progress'. The DSL service was ordered i.e., a New Order, Change Service, Disconnect Service was placed, that order has not yet been fulfilled and now the original request is being cancelled.

Note that it is possible to Cancel a Disconnect Service or a Change Service request.

A Cancel Order must contain at least one of the following sub-items:

#### 4.1.5.1 Cancel Broadband Service Order

Precondition: The broadband service has been previously ordered but is not yet activated.

Actors:

Requestor – end-user customer, Service Provider\*  
Responder – Service Provider

This use case is used to cancel a broadband service (voice, video, VPN, data, etc.) order by a Service Provider for an end-user customer. There may be more than one Service Provider involved in the request, in the case of a resale scenario. This use case applies to Layer 4 (and above).

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of order request/response messages:

Cancel Broadband Service Order Request  
Cancel Broadband Service Order Response

#### 4.1.5.2 Cancel RBN Transport Service Order

Precondition: ATU-C (e.g., DSLAM) identity is known.

Actors:

Requestor – Service Provider, RBN Provider\*  
Responder – RBN Provider, Access Provider  
Potential Participants – none

This use case is used to cancel an order for RBN transport service, between an Access Provider and a Service Provider, via one or more RBN Providers. This use case applies to Layer 2. The requestor must provide original order information.

\*When requestor and responder are both RBN Providers, they are different entities. As illustrated in Figure 2, there may be multiple RBN providers involved in providing the DSL Service.

This use case is implemented via a pair of messages:

Cancel RBN Transport Service Order Request  
Cancel RBN Transport Service Order Response

#### 4.1.5.3 Cancel Physical DSL Service Order

Precondition: Loop identity is known.

Actors:

Requestor – Service Provider  
Responder – Access Provider  
Potential Participants – RBN Provider

This use case is used to cancel an order for DSL service with specified parameters. This use case applies to Layer 1.

This use case is implemented via a pair of messages:

- Cancel Physical DSL Service Order Request
- Cancel Physical DSL Service Order Response

#### **4.1.5.4 Cancel Loop Order**

Actors:

- Requestor – Access Provider
- Responder – Loop Provider
- Potential Participants – Service Provider, RBN Provider

This use case is used to cancel an order for a DSL-compatible loop. This use case applies to Layer 1.

This use case is implemented via a pair of messages:

- Cancel Loop Order Request
- Cancel Loop Order Response

#### **4.1.5.5 Cancel CPE Order**

Precondition: none

Actors:

- Requestor – Access Provider, Service Provider
- Responder – CPE Provider

This use case is used to cancel an order for CPE hardware. This use case is at Layer 1. The responder returns with an acknowledgement of cancellation.

This use case is implemented via a pair of messages:

- Cancel CPE Order Request
- Cancel CPE Order Response

#### **4.1.5.6 Cancel Installation Order**

Precondition:

Actors:

- Requestor – Access Provider, Service Provider
- Responder – Field Installer

This use case is used to cancel an order for customer premise installation; e.g., CPE configuration, inside wiring, NIC installation, testing, etc. This use case is at Layers 1-4+. The responder may return with an acknowledgement of cancellation.

This use case is implemented via a pair of messages:

Cancel Installation Order Request  
Cancel Installation Order Response

#### **4.1.6 Change Service**

The Change Service activities are used to request changes to DSL service which has already been fulfilled. Examples of a change service request include a speed upgrade or downgrade, CPE change or upgrade, or change to DSL service type.

Initiating Event: A change of service is required when authorized by an end-user.

Precondition: Existing DSL service

A Change Service request must contain at least one of the following sub-items:

##### **4.1.6.1 Change Broadband Service**

Precondition: The underlying layers support the requested service.

Actors:

Requestor – end-user customer, Service Provider\*  
Responder – Service Provider

This use case is used to change broadband service (voice, video, VPN, data, etc.) by a Service Provider for an end-user customer. There may be more than one Service Provider involved in fulfillment, in the case of a resale scenario. This use case applies to Layer 4 (and above).

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of order request/response messages

Change Broadband Service Request  
Change Broadband Service Response

##### **4.1.6.2 Change Network Service**

Precondition: CPE specification is known. Broadband service type is known.

Actors:

Requestor – Service Provider\*  
Responder – Field Installer, Service Provider or none  
Potential Participants – Access Provider

This use case is used to order a change to the network services. This use case applies to Layer 3. The request includes information about IP assignment, DNS, etc. The response may be an acknowledgement that configuration has been performed.

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of messages:

Change Network Services Request  
Change Network Services Response

#### **4.1.6.3 Change Customer Access Transport Service**

Precondition: ATU-C (e.g., DSLAM) identity is known. CPE configuration is known.

Actors:

Requestor – Service Provider  
Responder – Access Provider

This use case is used to order a change to the customer premise transport service, along with SLA requirements, between an Access Provider and the customer premise. This use case applies to Layer 2. The responder may request changes to existing virtual circuit assignments.

This use case is implemented via a pair of messages:

Change Customer Access Transport Service Request  
Change Customer Access Transport Service Response

#### **4.1.6.4 Change RBN Transport Service**

Precondition: ATU-C (e.g., DSLAM) identity is known.

Actors:

Requestor – Service Provider, RBN Provider\*  
Responder – RBN Provider, Access Provider

This use case is used to order a change to the RBN transport service, along with SLA requirements, between an Access Provider and a Service Provider, via one or more RBN Providers. This use case applies to Layer 2. The requestor must provide originating circuit information. The responder may return virtual circuit assignments.

\*When requestor and responder are both RBN Providers, they are different entities. As illustrated in Figure 2, there may be multiple RBN providers involved in providing the DSL Service.

This use case is implemented via a pair of messages:

Change RBN Transport Service Request  
Change RBN Transport Service Response

#### **4.1.6.5 Change Physical DSL Service**

Precondition: Loop identity is known. CPE is compatible.

Actors:

Requestor – Service Provider  
Responder – Access Provider  
Potential Participants – RBN Provider

This use case is used to request a change to the DSL service with specified parameters (type, speed, SLA, etc.). This use case applies to Layer 1. The responder returns with the ATU-C (e.g., DSLAM) identity and port and may also respond with upstream speed, downstream speed, etc.

This use case is implemented via a pair of messages:

- Change Physical DSL Service Request
- Change Physical DSL Service Response

#### **4.1.6.6 Change Loop**

Actors:

- Requestor – Access Provider
- Responder – Loop Provider
- Potential Participants – Service Provider, RBN Provider

This use case is used to request conditioning of a DSL-compatible loop. This use case applies to Layer 1. The responder returns the loop identity; i.e., Circuit ID, telephone number.

This use case is implemented via a pair of messages:

- Change Loop Request
- Change Loop Response

#### **4.1.7 Disconnect Service**

The Disconnect Service activities are used to disconnect DSL service which has already been fulfilled.

Initiating Event: A Disconnect Order for DSL and/or services provided over DSL.

Precondition: DSL Service already exists at the location.

A Disconnect Order request must contain at least one of the following sub-items:

##### **4.1.7.1 Disconnect Broadband Service**

Precondition: The broadband service has been previously ordered and is active.

Actors:

- Requestor – end-user customer, Service Provider\*
- Responder – Service Provider

This use case is used to disconnect broadband service (voice, video, VPN, data, etc.) by a Service Provider for an end-user customer. There may be more than one Service Provider involved in the Disconnect, in the case of a resale scenario. This use case applies to Layer 4 (and above).

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of order request/response messages

Disconnect Broadband Service Request  
Disconnect Broadband Service Response

#### **4.1.7.2 Disconnect Network Service**

Precondition: CPE specification is known. Broadband service type is known.

Actors:

Requestor – Service Provider\*  
Responder – Field Installer, Service Provider or none  
Potential Participants – Access Provider

This use case is used to disconnect existing network services. This use case applies to Layer 3. The response may be an acknowledgement that disconnect has been performed.

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of messages and a notification:

Disconnect Network Service Request  
Disconnect Network Service Response

#### **4.1.7.3 Disconnect Customer Access Transport Service**

Precondition: ATU-C (e.g., DSLAM) identity is known. CPE configuration is known.

Actors:

Requestor – Service Provider  
Responder – Access Provider  
Potential Participants – none

This use case is used to disconnect customer premise transport service, between an Access Provider and the customer premise. This use case applies to Layer 2.

This use case is implemented via a pair of messages:

Disconnect Customer Access Transport Service Request  
Disconnect Customer Access Transport Service Response

#### **4.1.7.4 Disconnect RBN Transport Service**

Precondition: ATU-C (e.g., DSLAM) identity is known.

Actors:

Requestor – Service Provider, RBN Provider\*  
Responder – RBN Provider, Access Provider  
Potential Participants – none

This use case is used to disconnect existing RBN transport service, between an Access Provider and a Service Provider, via one or more RBN Providers. This use case applies to Layer 2. The requestor must provide originating circuit information.

\*When requestor and responder are both RBN Providers, they are different entities. As illustrated in Figure 2, there may be multiple RBN providers involved in providing the DSL Service.

This use case is implemented via a pair of messages:

- Disconnect RBN Transport Service Request
- Disconnect RBN Transport Service Response

#### **4.1.7.5 Disconnect Physical DSL Service**

Precondition: Loop identity is known.

Actors:

- Requestor – Service Provider
- Responder – Access Provider
- Potential Participants – RBN Provider

This use case is used to disconnect the existing DSL service with specified parameters. This use case applies to Layer 1.

This use case is implemented via a pair of messages:

- Disconnect Physical DSL Service Request
- Disconnect Physical DSL Service Response

#### **4.1.7.6 Disconnect Loop**

Actors:

- Requestor – Access Provider
- Responder – Loop Provider
- Potential Participants – Service Provider, RBN Provider

This use case is used to disconnect a DSL-compatible loop. This use case applies to Layer 1.

This use case is implemented via a pair of messages:

- Disconnect Loop Request
- Disconnect Loop Response

#### **4.1.7.7 Disconnect CPE**

Precondition: none

Actors:

- Requestor – Access Provider, Service Provider
- Responder – CPE Provider

This use case is used to disconnect CPE hardware. This use case is at Layer 1. The responder returns with an acknowledgement.



This use case is implemented via a pair of messages:

Disconnect CPE Request  
Disconnect CPE Response

#### **4.1.7.8 Disconnect Installation**

Precondition:

Actors:

Requestor – Access Provider, Service Provider  
Responder – Field Installer

This use case is used to uninstall customer premise equipment; e.g., CPE configuration, inside wiring, NIC installation, etc. This use case is at Layers 1-4 (and above). The responder may return with an acknowledgement and schedule information.

This use case is implemented via a pair of messages:

Disconnect Installation Request  
Disconnect Installation Response

#### **4.1.8 Suspend Service**

A suspend service is used to suspend DSL service which has already been provisioned. Suspension differs from disconnection in that likely no tear-down takes place in the case of Suspension. The flow-through is for informational purposes only, except in the case where aggregator is performing authentication.

##### **4.1.8.1 Suspend Broadband Service**

Actors:

Requestor – end-user customer, Service Provider\*  
Responder – Service Provider

This use case is used to suspend broadband service by a Service Provider for an end-user customer. There may be more than one Service Provider involved in fulfillment, in the case of a resale scenario. This use case applies to Layer 4 (and above).

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of order request/response messages:

Suspend Broadband Service Request  
Suspend Broadband Service Response

##### **4.1.8.2 Suspend Network Service**

Actors:

Requestor – Service Provider\*  
Responder – Field Installer, Service Provider or none  
Potential Participants – Access Provider

This use case is used to suspend existing network services. This use case applies to Layer 3. The response may be an acknowledgement that suspend has been performed.

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of messages:

Suspend Network Service Request  
Suspend Network Service Response

#### **4.1.8.3 Suspend Customer Access Transport Service**

Actors:

Requestor – Service Provider  
Responder – Access Provider  
Potential Participants – none

This use case is used to suspend customer premise transport service, between an Access Provider and the customer premise. This use case applies to Layer 2.

This use case is implemented via a pair of messages:

Suspend Customer Access Transport Service Request  
Suspend Customer Access Transport Service Response

#### **4.1.8.4 Suspend RBN Transport Service**

Actors:

Requestor – Service Provider, RBN Provider\*  
Responder – RBN Provider, Access Provider  
Potential Participants – none

This use case is used to suspend existing RBN transport service, between an Access Provider and a Service Provider, via one or more RBN Providers. This use case applies to Layer 2. The requestor must provide originating circuit information.

\*When requestor and responder are both RBN Providers, they are different entities. As illustrated in Figure 2, there may be multiple RBN providers involved in providing the DSL Service.

This use case is implemented via a pair of messages:

Suspend RBN Transport Service Request  
Suspend RBN Transport Service Response

#### **4.1.9 Resume Service**

A resume service is used to resume DSL service which has previously been suspended.

#### **4.1.9.1 Resume Broadband Service**

Precondition: The underlying layers support the requested service.

Actors:

Requestor – end-user customer, Service Provider\*  
Responder – Service Provider

This use case is used to resume broadband service by a Service Provider for an end-user customer. There may be more than one Service Provider involved in fulfillment, in the case of a resale scenario. This use case applies to Layer 4 (and above).

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of order request/response messages

Resume Broadband Service Request  
Resume Broadband Service Response

#### **4.1.9.2 Resume Network Service**

Actors:

Requestor – Service Provider\*  
Responder – Field Installer, Service Provider or none  
Potential Participants – Access Provider

This use case is used to resume existing network services. This use case applies to Layer 3. The response may be an acknowledgement that suspend has been performed.

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of messages:

Resume Network Service Request  
Resume Network Service Response

#### **4.1.9.3 Resume Customer Access Transport Service**

Actors:

Requestor – Service Provider  
Responder – Access Provider  
Potential Participants – none

This use case is used to resume customer premise transport service, between an Access Provider and the customer premise. This use case applies to Layer 2.

This use case is implemented via a pair of messages:

Resume Customer Access Transport Service Request  
Resume Customer Access Transport Service Response

#### 4.1.9.4 Resume RBN Transport Service

Actors:

Requestor – Service Provider, RBN Provider\*  
Responder – RBN Provider, Access Provider  
Potential Participants – none

This use case is used to resume RBN transport service, between an Access Provider and a Service Provider, via one or more RBN Providers. This use case applies to Layer 2. The requestor must provide originating circuit information.

\*When requestor and responder are both RBN Providers, they are different entities. As illustrated in Figure 2, there may be multiple RBN providers involved in providing the DSL Service.

This use case is implemented via a pair of messages:

Resume RBN Transport Service Request  
Resume RBN Transport Service Response

#### 4.1.10 Service Configuration

The Service Configuration activities involve querying for the status of an established service, where no outstanding order exists. These activities are used to request service and/or records information about an established service, or configuration information regarding an established service.

A Service Configuration notification may be used to notify affected parties about network infrastructure changes, a record change (such as a person's name change), or a billing record change due to reorganization of accounts.

A Service Configuration request is used to obtain information about a service configuration in the case the records are not kept by the requestor, or in the case where records are lost, or a change notification is missed.

A Service Configuration request must contain at least one of the following sub-items:

##### 4.1.10.1 Broadband Service Configuration

Actors:

Requestor – end-user customer, Service Provider\*  
Responder – Service Provider  
Notifier – Service Provider

This use case is used to query about the status of an established broadband service (voice, video, VPN, data, etc.). There may be more than one Service Provider involved, in the case of a resale scenario. This use case applies to Layer 4 (and above). The responder returns service configuration information in the response.

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of messages and a change notification:

- Broadband Service Configuration Request
- Broadband Service Configuration Response
- Broadband Service Change Notification

#### **4.1.10.2 Network Service Configuration**

Actors:

- Requestor – Service Provider\*
- Responder – Field Installer, Service Provider or none
- Notifier – Field Installer, Service Provider
- Potential Participants – Access Provider, RBN Provider

This use case is used to query about configuration of established network services. This use case applies to Layer 3. The responder returns service configuration information in the response.

\*When requestor and responder are both Service Providers, they are different entities.

This use case is implemented via a pair of messages and a change notification:

- Network Service Configuration Request
- Network Service Configuration Response
- Network Service Change Notification

#### **4.1.10.3 Customer Access Transport Service Configuration**

Actors:

- Requestor – Service Provider
- Responder – Access Provider
- Notifier – Access Provider

This use case is used to query about configuration of an established customer premise transport service between an Access Provider and the customer premise. This use case applies to Layer 2. The responder returns service configuration information in the response.

This use case is implemented via a pair of messages and a change notification:

- Customer Access Transport Service Configuration Request
- Customer Access Transport Service Configuration Response
- Customer Access Transport Service Change Notification

#### **4.1.10.4 RBN Transport Service Configuration**

Actors:

- Requestor – Service Provider, RBN Provider\*
- Responder – RBN Provider, Access Provider
- Notifier – RBN Provider, Access Provider

This use case is used to query about configuration of an established RBN transport service. This use case applies to Layer 2. The responder returns service configuration information in the response.

\*When requestor and responder are both RBN Providers, they are different entities. As illustrated in Figure 2, there may be multiple RBN providers involved in providing the DSL Service.

This use case is implemented via a pair of messages and a change notification:

- RBN Transport Service Configuration Request
- RBN Transport Service Configuration Response
- RBN Transport Service Order Status Notification

#### **4.1.10.5 Physical DSL Service Configuration**

Precondition: Loop identity is known. CPE is compatible.

Actors:

- Requestor – Service Provider
- Responder – Access Provider
- Potential Participants – RBN Provider

This use case is used to query about configuration of an established DSL service. This use case applies to Layer 1. The responder returns service configuration information in the response.

This use case is implemented via a pair of messages and a change notification:

- Physical DSL Service Configuration Request
- Physical DSL Service Configuration Response
- Physical DSL Service Change Notification

#### **4.1.10.6 Loop Configuration**

Actors:

- Requestor – Access Provider
- Responder – Loop Provider
- Potential Participants – Service Provider, RBN Provider

This use case is used to query about the configuration of a DSL-compatible loop. This use case applies to Layer 1. The responder returns configuration information in the response.

This use case is implemented via a pair of messages and a change notification:

- Loop Configuration Request
- Loop Configuration Response
- Loop Change Notification

#### **4.1.10.7 CPE Configuration**

Actors:

Requestor – Access Provider, Service Provider

Responder – CPE Provider

This use case is query about the configuration of a CPE. This use case is at Layer 1. The responder returns configuration information in the response.

This use case is implemented via a pair of messages and a change notification:

CPE Configuration Request

CPE Configuration Response

CPE Change Notification

## **5. GLOSSARY AND REFERENCES**

### **5.1 Glossary of Terms, Acronyms and Terminology**

#### **5.1.1 Customer Premises (CP)**

As defined in TR-022,

- the location, which could be a home, office, or other location wherein the CPE resides. The terms CPE and CLE are defined from a Provider's perspective.

##### **5.1.1.1 Customer Premises Equipment (CPE)**

Historically, the term CPE has been viewed as equipment that is part of the End-User's network.

##### **5.1.1.2 Customer Located Equipment (CLE)**

The term CLE refers to equipment that is viewed as being part of the Provider's network.

Unless explicitly called out, this document will use the term CPE to refer to both, regardless of who owns or provides it.

#### **5.1.2 Loop Provider (LP)**

As defined in TR-022, the Loop Provider

- provides a metallic loop from the access network equipment to the customer's premises,
- is responsible for the integrity of the metallic loop and its repair.

#### **5.1.3 Access Provider (AP)**

As defined in TR-022, the Access Provider (a.k.a. Network Access Provider or NAP)

- provides digital connectivity to the customer,
- is responsible for the performance and repair of the access transmission equipment.

Traditionally the AP is the entity that "owns" the DSLAM. An AP may provide multiple simultaneous connections to multiple Regional Network Providers.

#### **5.1.4 Regional Network Provider (RNP)**

As defined in TR-022, the Regional Network Provider (a.k.a. Network Service Provider or NSP)

- provides appropriate connectivity between the Access Provider and the server [i.e., the Service Provider],
- is responsible for regional network performance and repair.



In addition, TR-025 introduces the term Regional Broadband Network (RBN) which interconnects Access Networks and Network Service Provider networks. TR-025 also states that the RBN does the following functions:

- Provides service provisioning and backbone bandwidth allocation.
- May provide aggregation of PPP traffic.
- May provide signaling and service interworking.
- May provide proxy Authentication, Accounting, Addressing and Authorization.

Several third-party entities have begun to use the term Access Aggregator to define the role they fulfill in the DSL Service supply chain. Because the functions these third parties provide are encompassed within the DSL Forum definition for Regional Network Provider, as defined above, the term RNP is used in this Working Text.

### **5.1.5 Service Provider (SP)**

As defined in TR-022, the Service Provider

- provides service to the end customer [i.e., End-User],
- is responsible for overall service assurance and, in particular, the aspects of service that are independent of the network between the server and the customer,
- may provide CPE, or software to run on customer-owned CPE, to support a given service.

An SP provides higher-layer application-level services such as voice, video, audio and/or basic layer-3 access.

It is possible for a Service Provider to interact directly with an Access Provider (Figure 1) in certain business process scenarios, such as Pre-Qualification of a loop.

### **5.1.6 Service Level Agreement (SLA)**

An SLA defines the level and/or quality of mission-critical services between trading partners.

### **5.1.7 Reference Points**

The reference points A11, A10, V, U, T, S are indicated in the protocol layers identified in Figures 3 and 4. The reference points A10, V and U are defined in TR-025. The reference points V, U, T and S correspond to ITU practice. A10 and A11 come from DAVIC (Digital Audio Visual Council) as there are no ITU equivalents:

#### **5.1.7.1 A11 Reference Point**

This is the interface point between the Service Provider System (i.e., the content provider system) and the Service Provider Network.

### **5.1.7.2 A10 Reference Point**

This is the interface point between the Regional Broadband Network and the Network Service Provider Points of Presence (POPs). Multiple PPP sessions may be multiplexed over a single Virtual Circuit Connection (VCC) at this interface.

The A10 reference point serves as the sync for the broadband service or may serve as a gateway function for service delivery.

### **5.1.7.3 V Reference Point**

A logical interface called V-C connects the individual ATU-C functions at the Access Node to the corresponding ATM layer functions of the RBN.

### **5.1.7.4 U Reference Point**

This reference point lies between the Access Node and the Broadband Network Termination (ATU-R).

### **5.1.7.5 T Reference Point**

This is the interface point between the Broadband Network Termination (ATU-R) and the Customer Premises Network.

### **5.1.7.6 S Reference Point**

This is the interface point between the Customer Premises Network and the Customer Premises terminal equipment.

## **5.2 References**

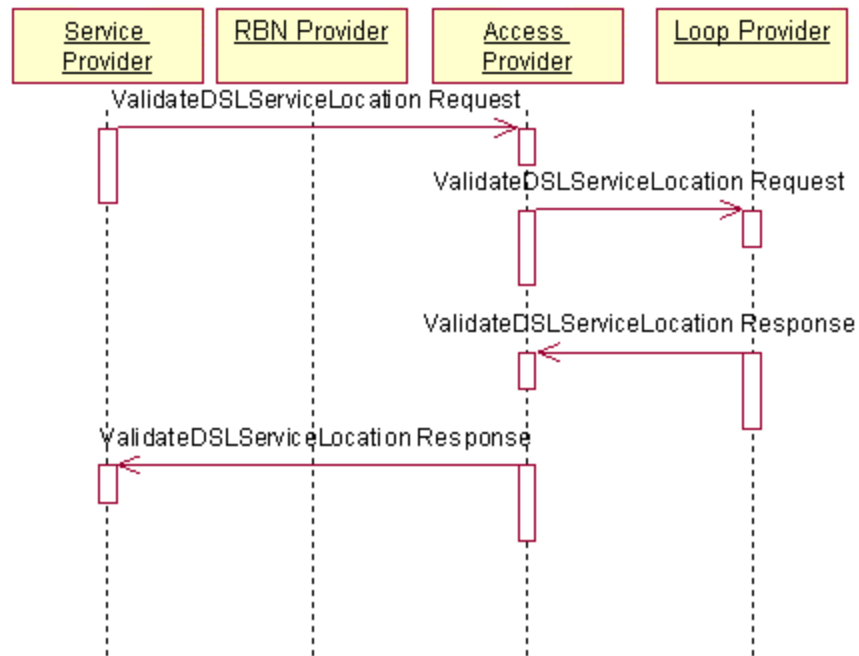
1. DSL Forum Contribution 99-200, "Automating the ISP to CLEC Interaction of the xDSL Supply Chain," August 1999.
2. DSL Forum Contribution 99-307, "Inter-Provider Operational and Network Management Requirements," November 1999.
3. DSL Forum Contribution 99-314, "Status of xDSL Service Supply Chain Standardization Focus Group," November 1999.
4. DSL Forum Contribution 00-048, "DSL Service Flow-Thru Management Requirements," February 2000.
5. DSL Forum Working Text WT -032v5, "CPE Architecture Recommendations for Access to Legacy Data Networks," February 2000.
6. DSL Forum Technical Report TR-022, "The Operation of ADSL-based Networks," August 1999.

7. DSL Forum Technical Report TR-025, "Core Network Architecture Recommendations for Access to Legacy Data Networks over ADSL," November 1999.

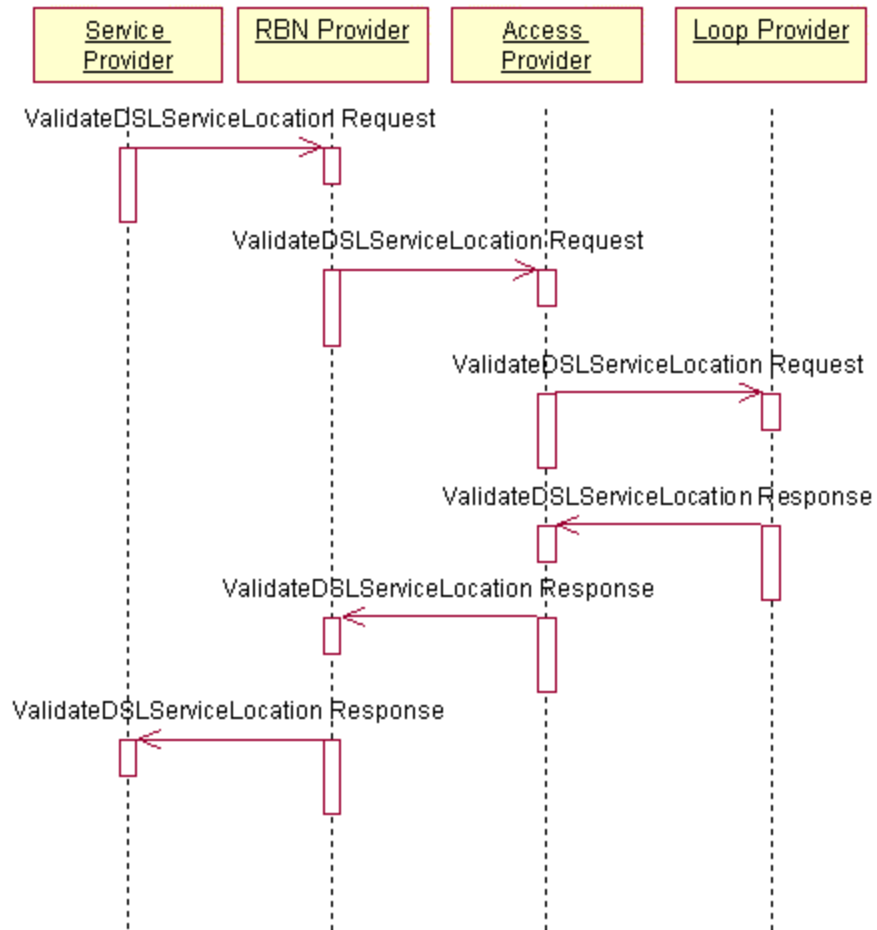
## Appendix A Sequence Diagrams

This appendix contains Sequence Diagrams for each use case described in Section 4, Interaction Models.

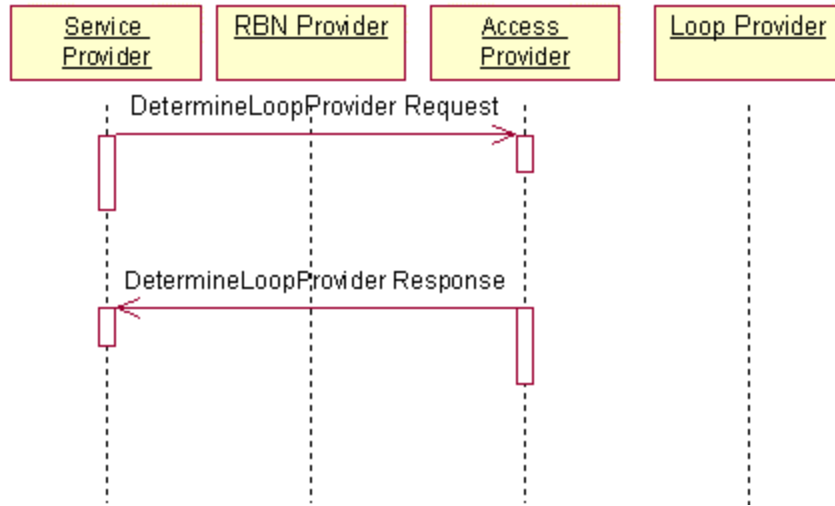
### Service Fulfillment: Pre-Order 4.1.1.1\_1 Validate DSL Service Location



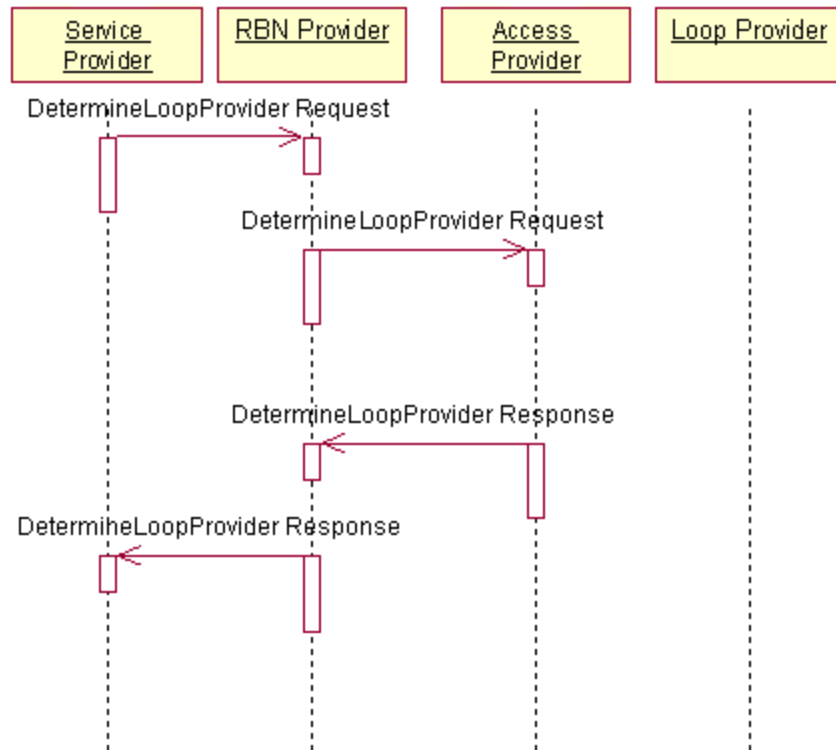
## Service Fulfillment: Pre-Order 4.1.1.1\_2 Validate DSL Service Location



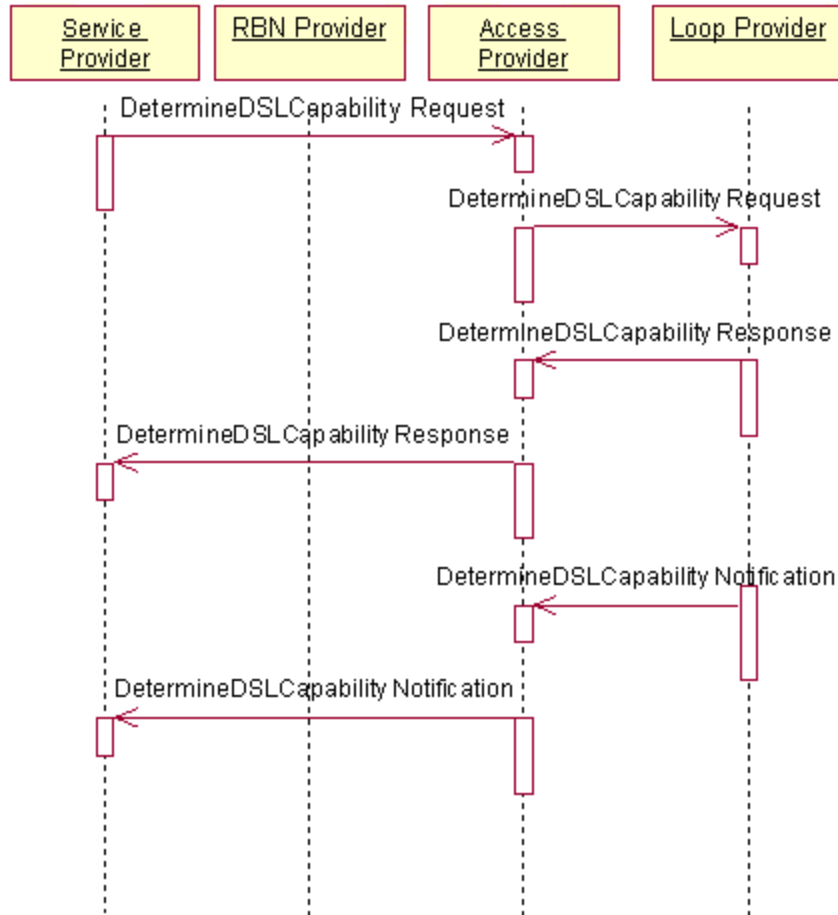
**Service Fulfillment: Pre-Order 4.1.1.2\_1**  
**Determine Loop Provider**



## Service Fulfillment: Pre-Order 4.1.1.2\_2 Determine Loop Provider

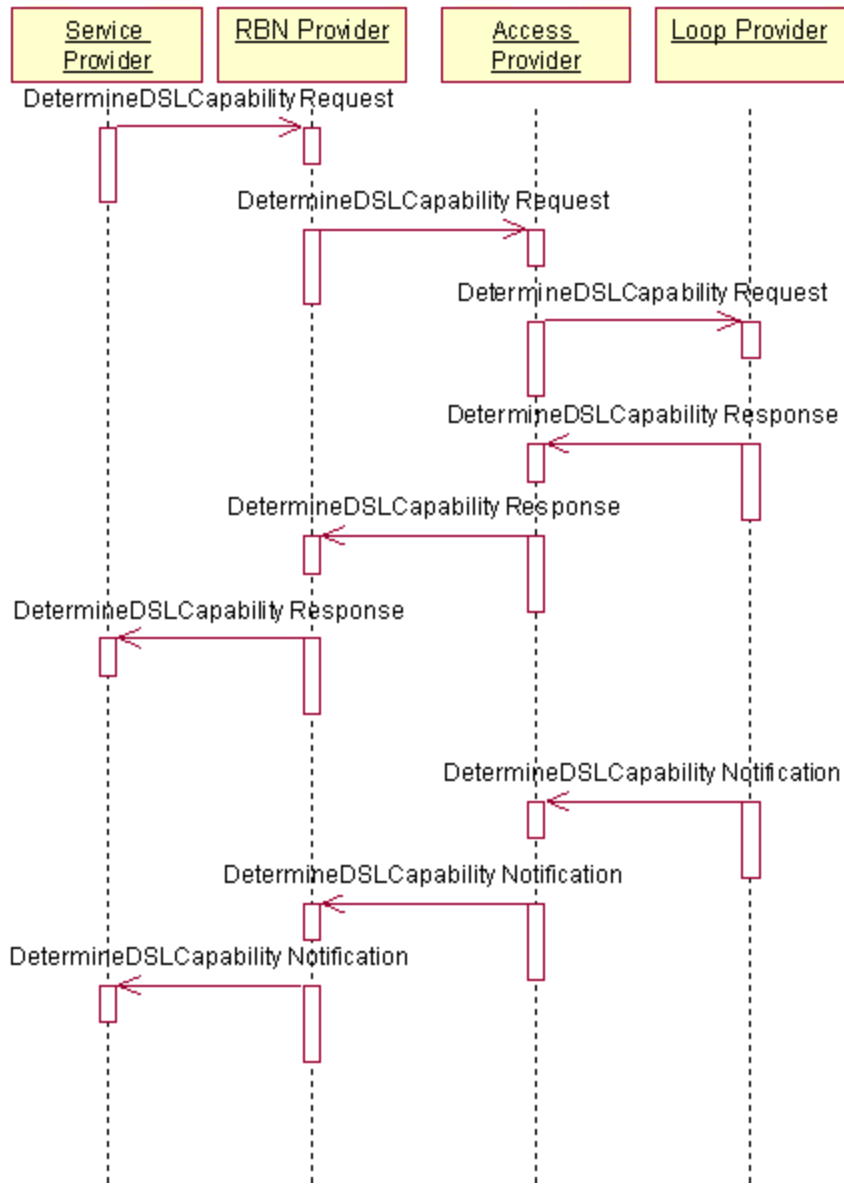


## Service Fulfillment: Prequalification 4.1.2.1\_1 Determine DSL Capability

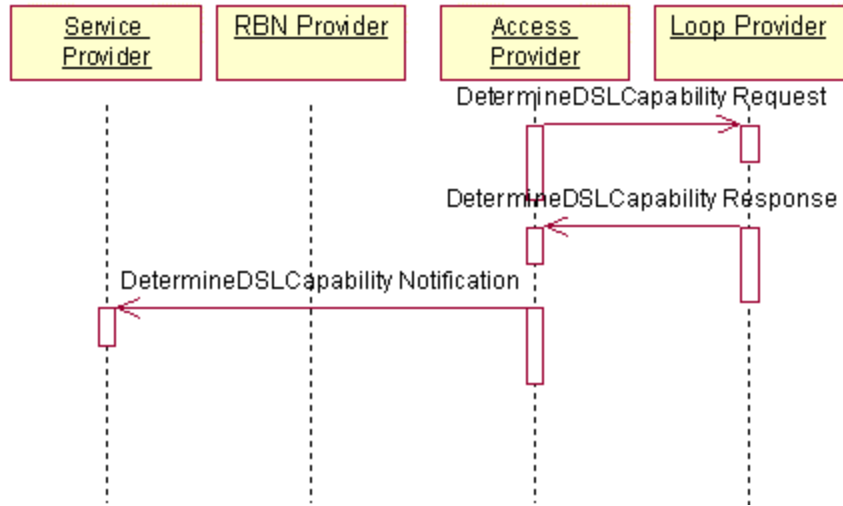




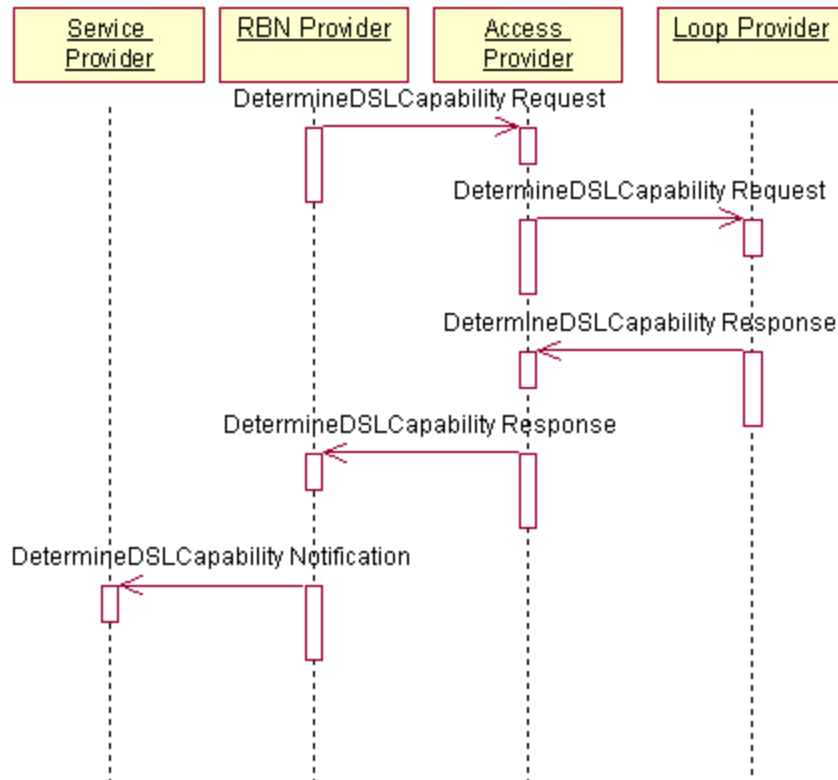
**Service Fulfillment: Prequalification 4.1.2.1\_2**  
**Determine DSL Capability**



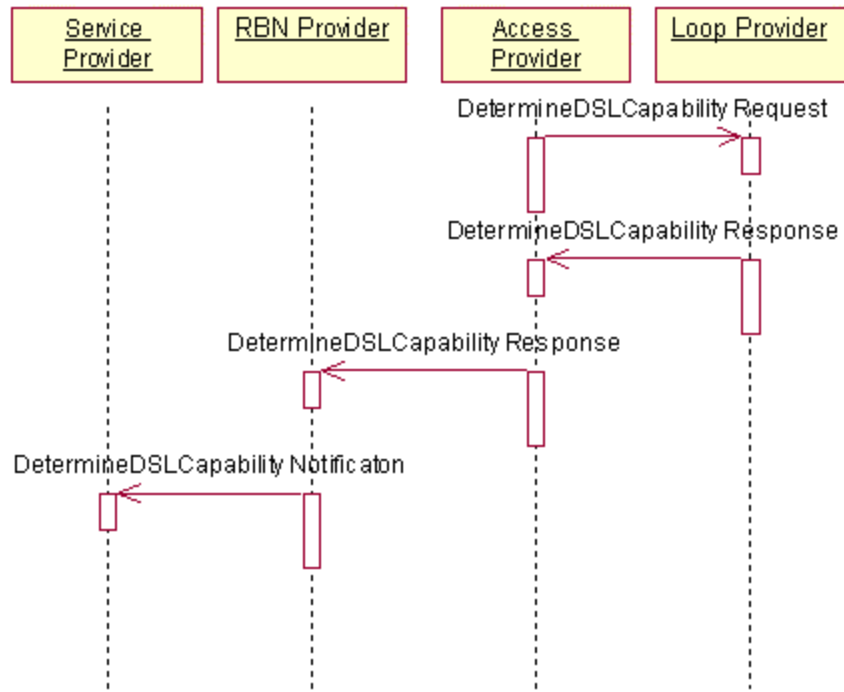
**Service Fulfillment: Prequalification 4.1.2.1\_3**  
**Determine DSL Capability**



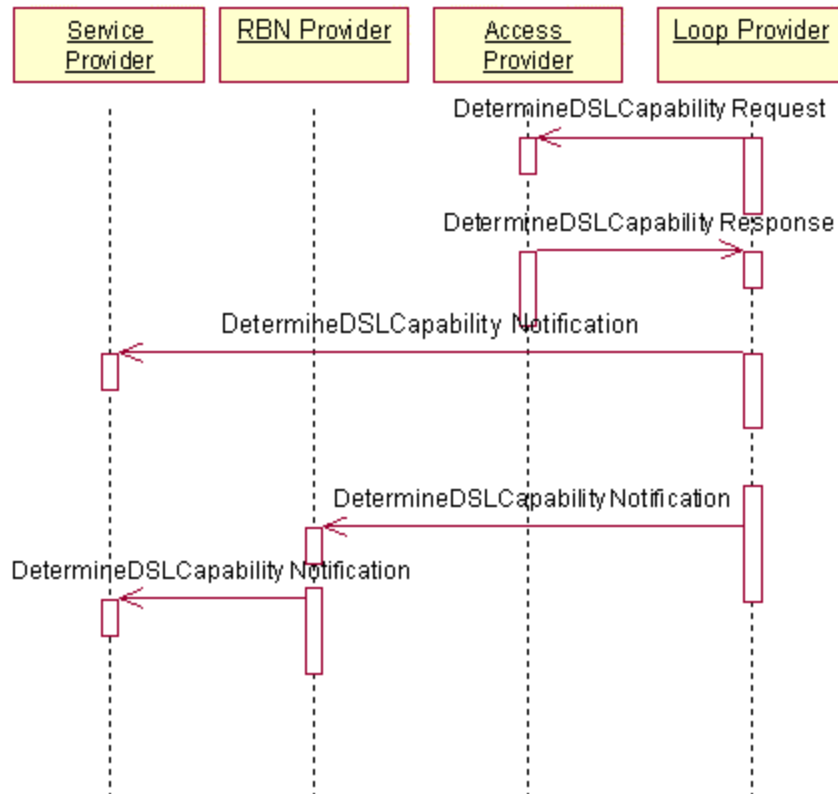
## Service Fulfillment: Prequalification 4.1.2.1\_4 Determine DSL Capability



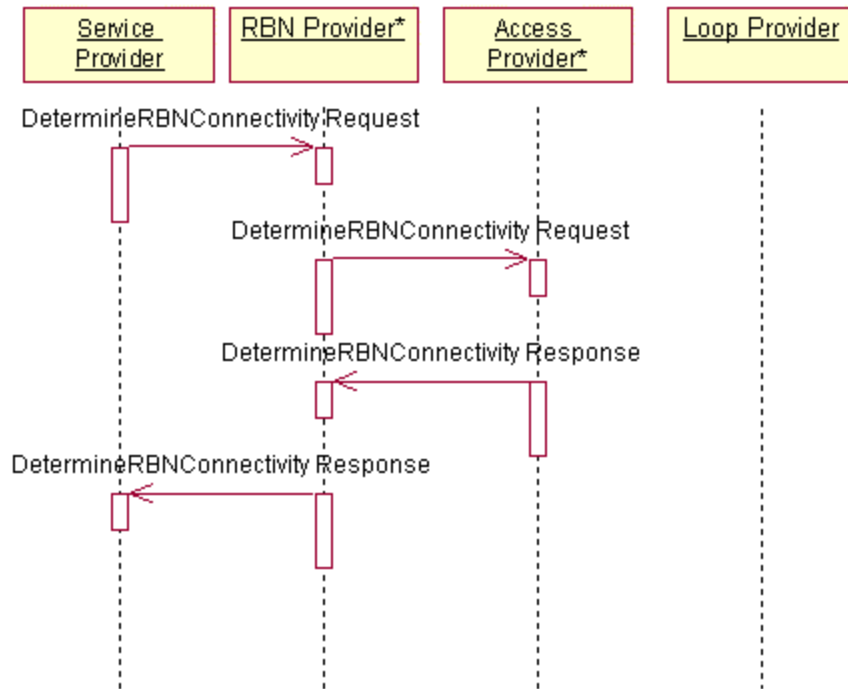
## Service Fulfillment: Prequalification 4.1.2.1\_5 Determine DSL Capability



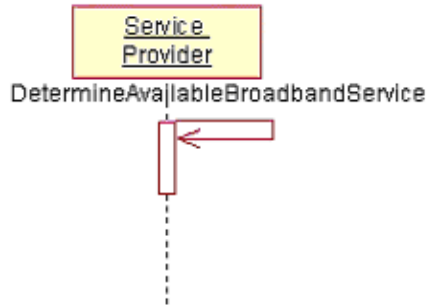
## Service Fulfillment: Prequalification 4.1.2.1\_6 Determine DSL Capability



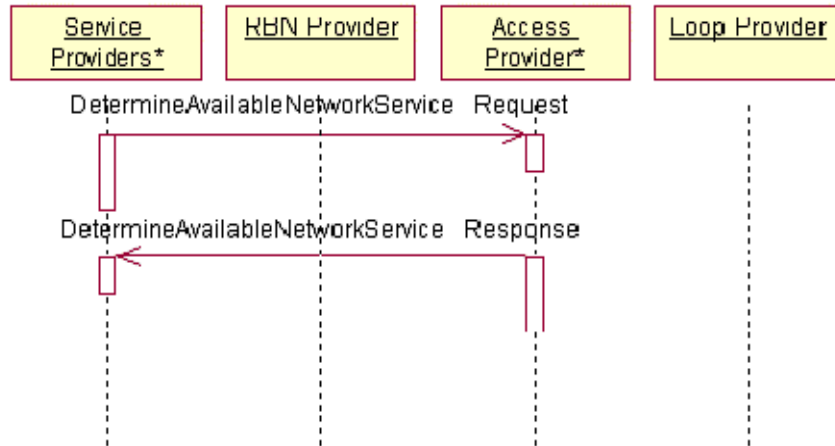
## Service Fulfillment: Prequalification 4.1.2.2\_1 Determine RBN Connectivity



**Service Fulfillment: Prequalification 4.1.2.3\_1**  
**Determine Available Broadband Service**

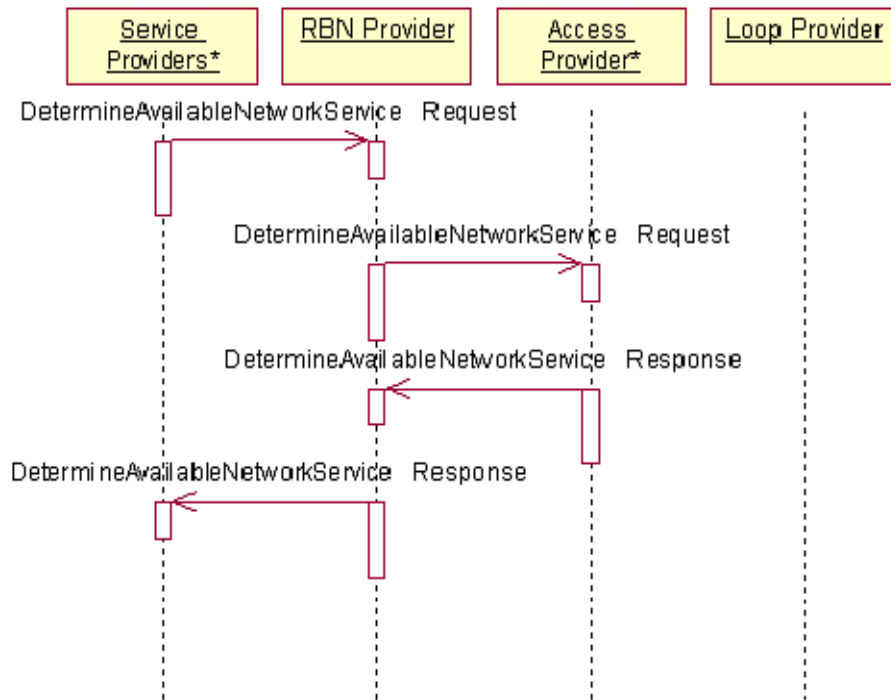


**Service Fulfillment: Prequalification 4.1.2.4\_1**  
**Determine Available Network Service**

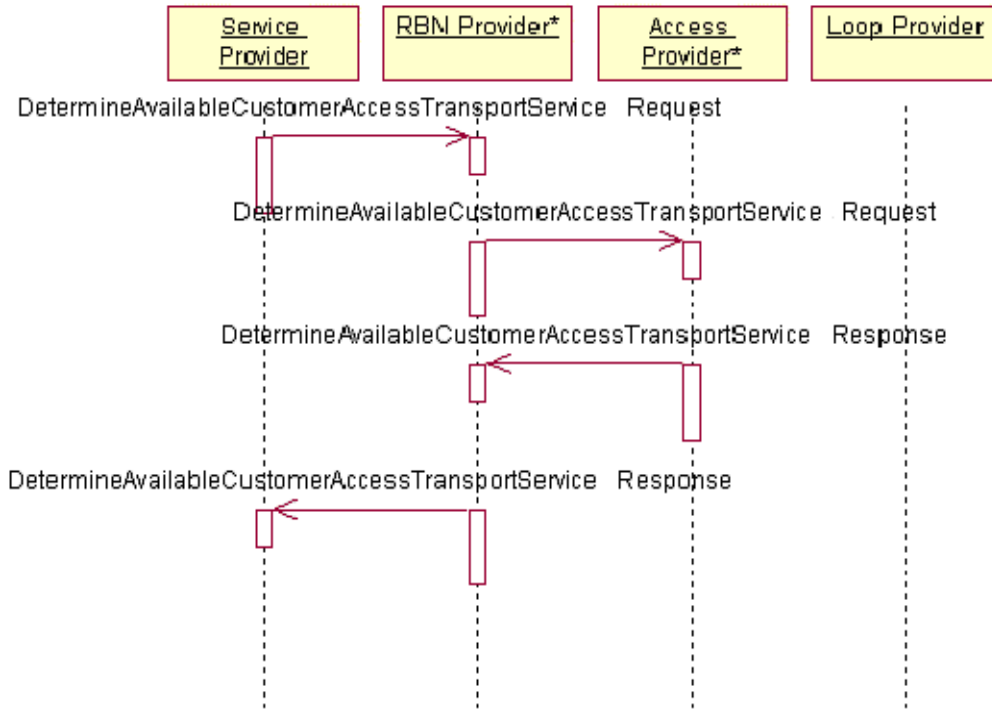




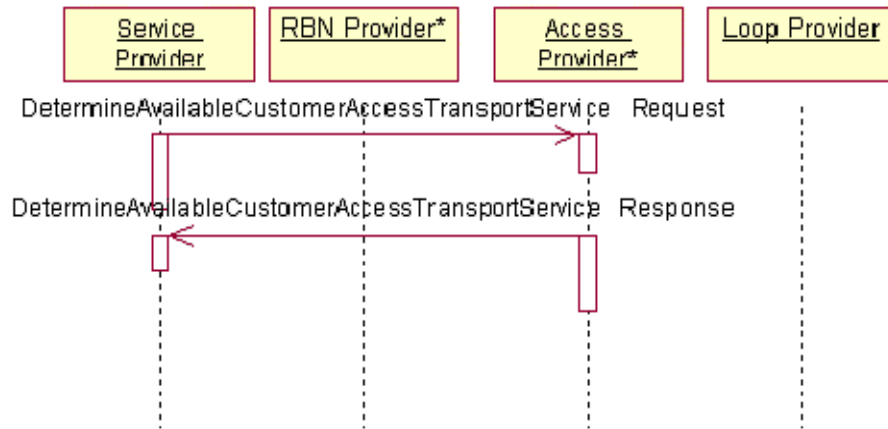
## SService Fulfillment: Prequalification 4.1.2.4\_2 Determine Available Network Service



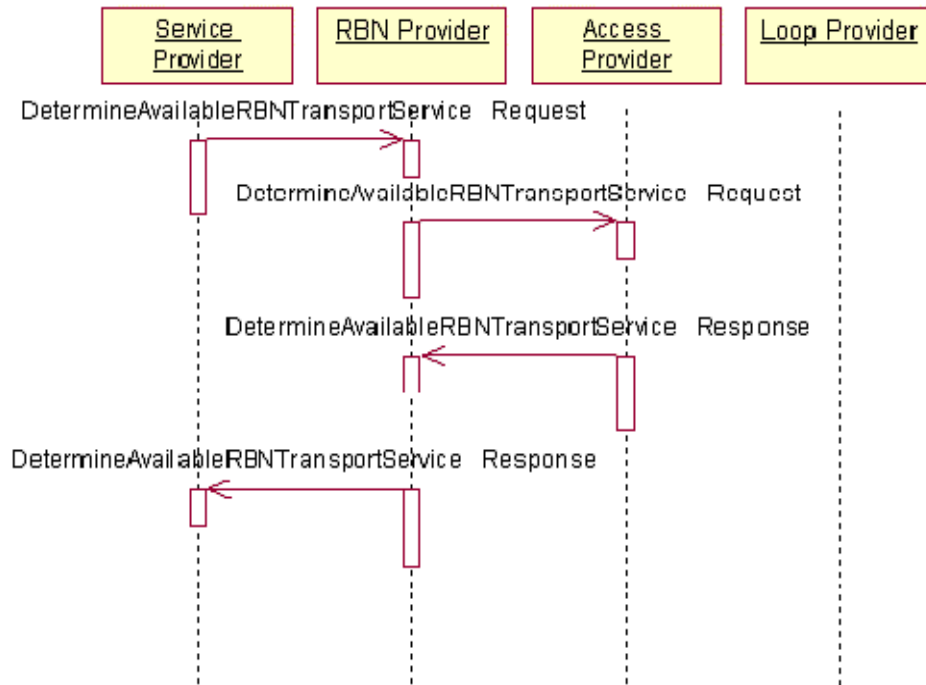
**Service Fulfillment: Prequalification 4.1.2.5\_1**  
**Determine Available Customer Access Transport Service**



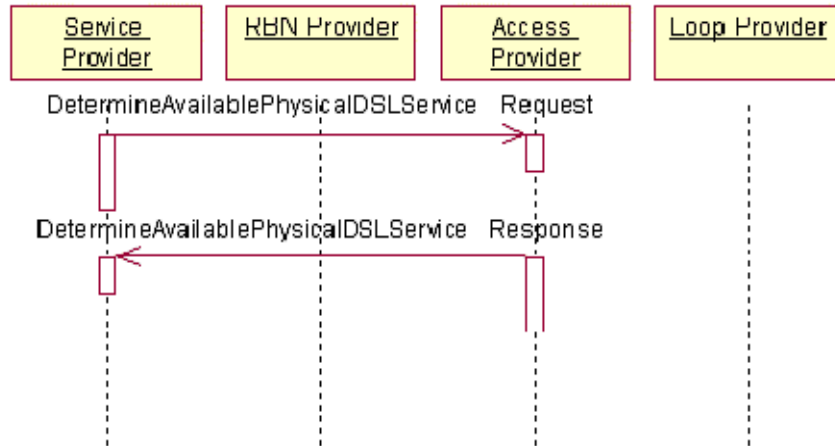
**Service Fulfillment: Prequalification 4.1.2.5\_2**  
**Determine Available Customer Access Transport Service**



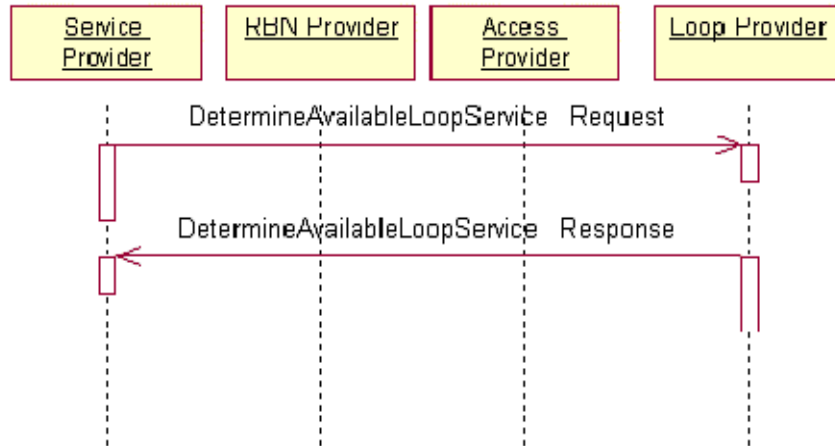
**Service Fulfillment: Prequalification 4.1.2.6\_1**  
**Determine Available RBN Transport Service**



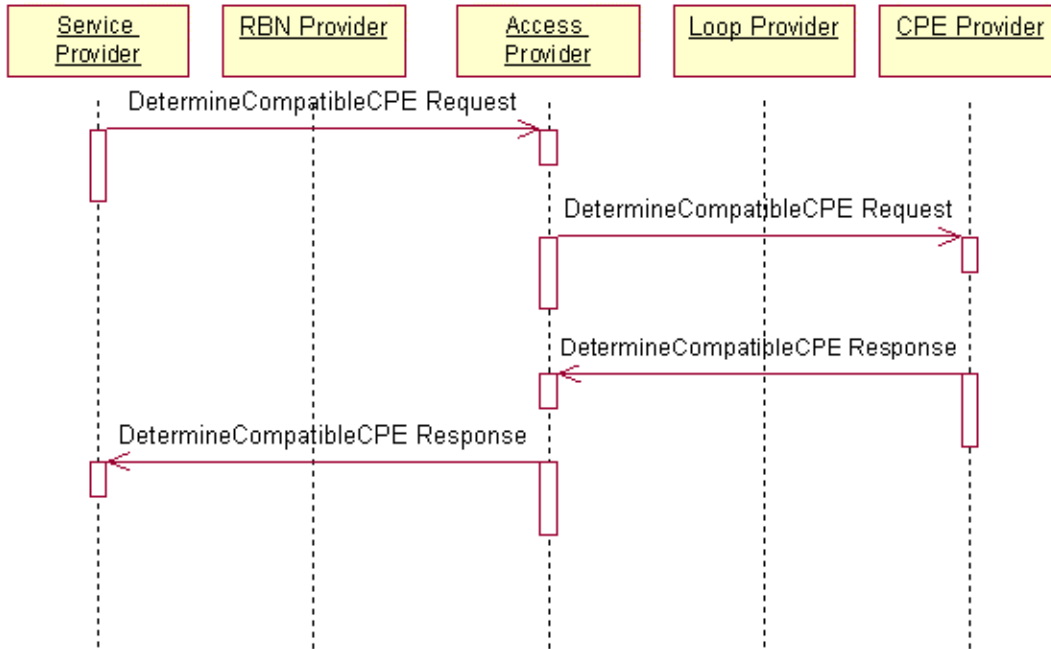
**Service Fulfillment: Prequalification 4.1.2.7\_1**  
**Determine Available Physical DSL Service**



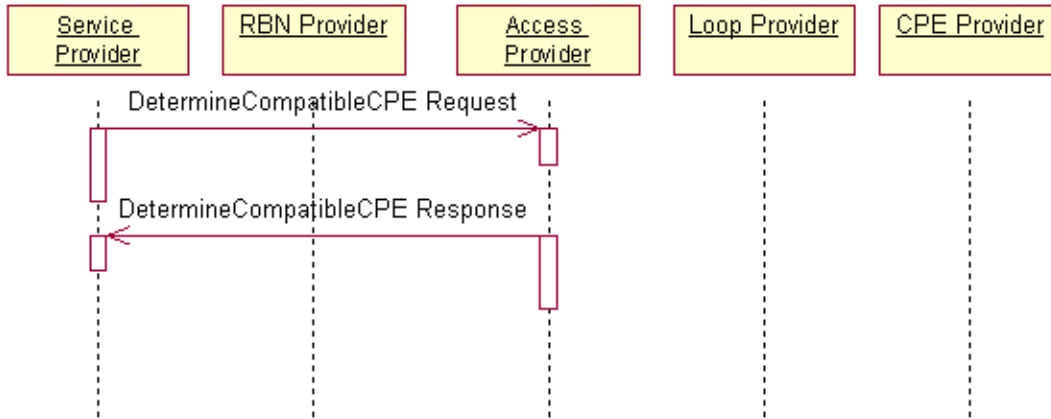
**Service Fulfillment: Prequalification 4.1.2.8\_1**  
**Determine Available Loop Service**



## Service Fulfillment: Prequalification 4.1.2.9\_1 Determine Compatible CPE

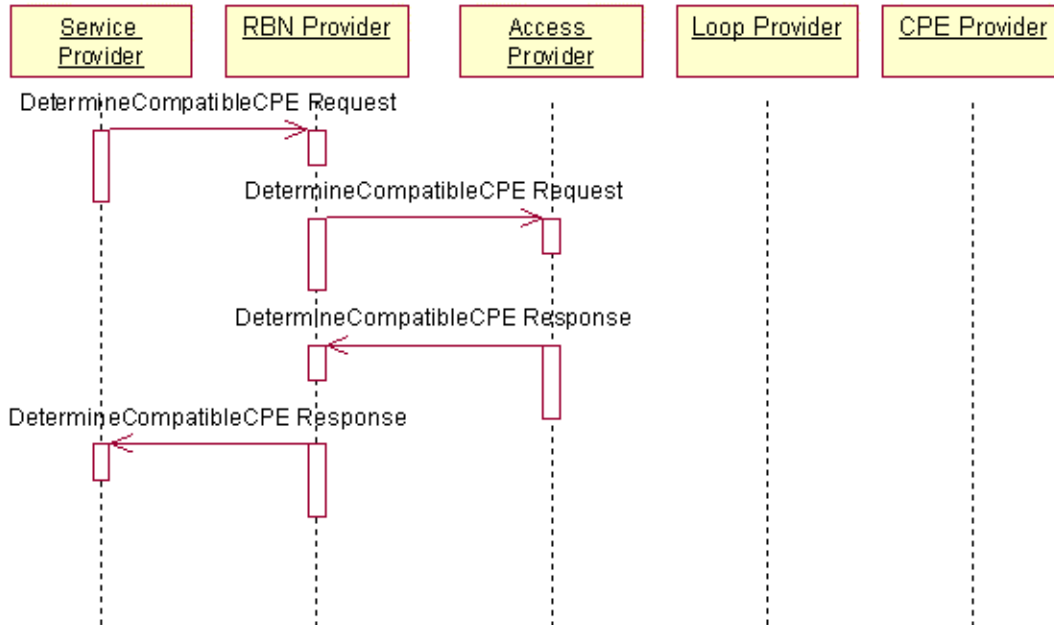


**Service Fulfillment: Prequalification 4.1.2.9\_2**  
**Determine Compatible CPE**

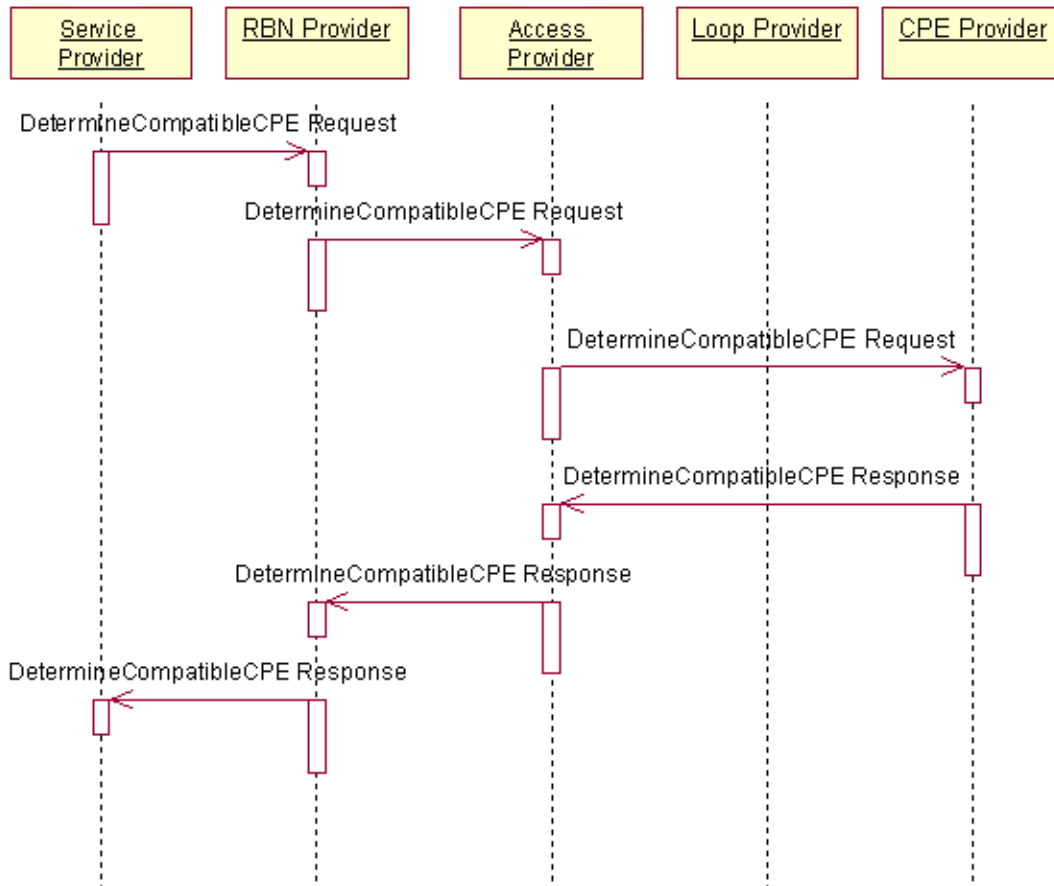




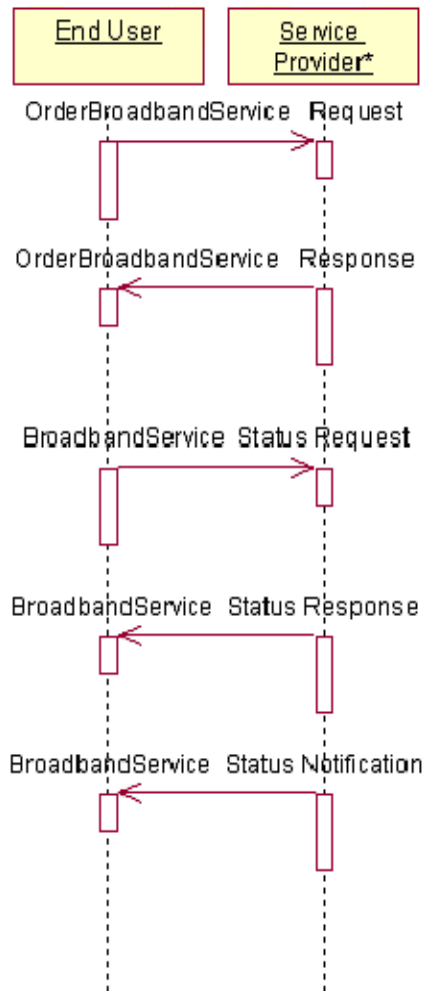
### Service Fulfillment: Prequalification 4.1.2.9\_3 Determine Compatible CPE



## Service Fulfillment: Prequalification 4.1.2.9\_4 Determine Compatible CPE

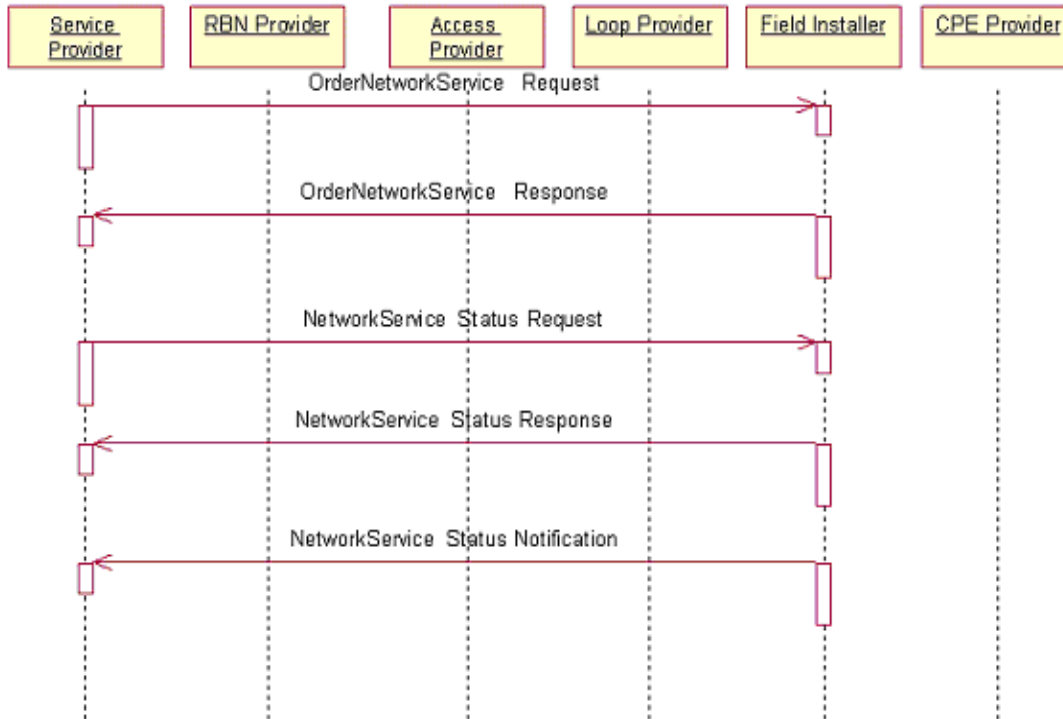


## Service Fulfillment: New Service 4.1.3.1\_1 Order Broadband Service

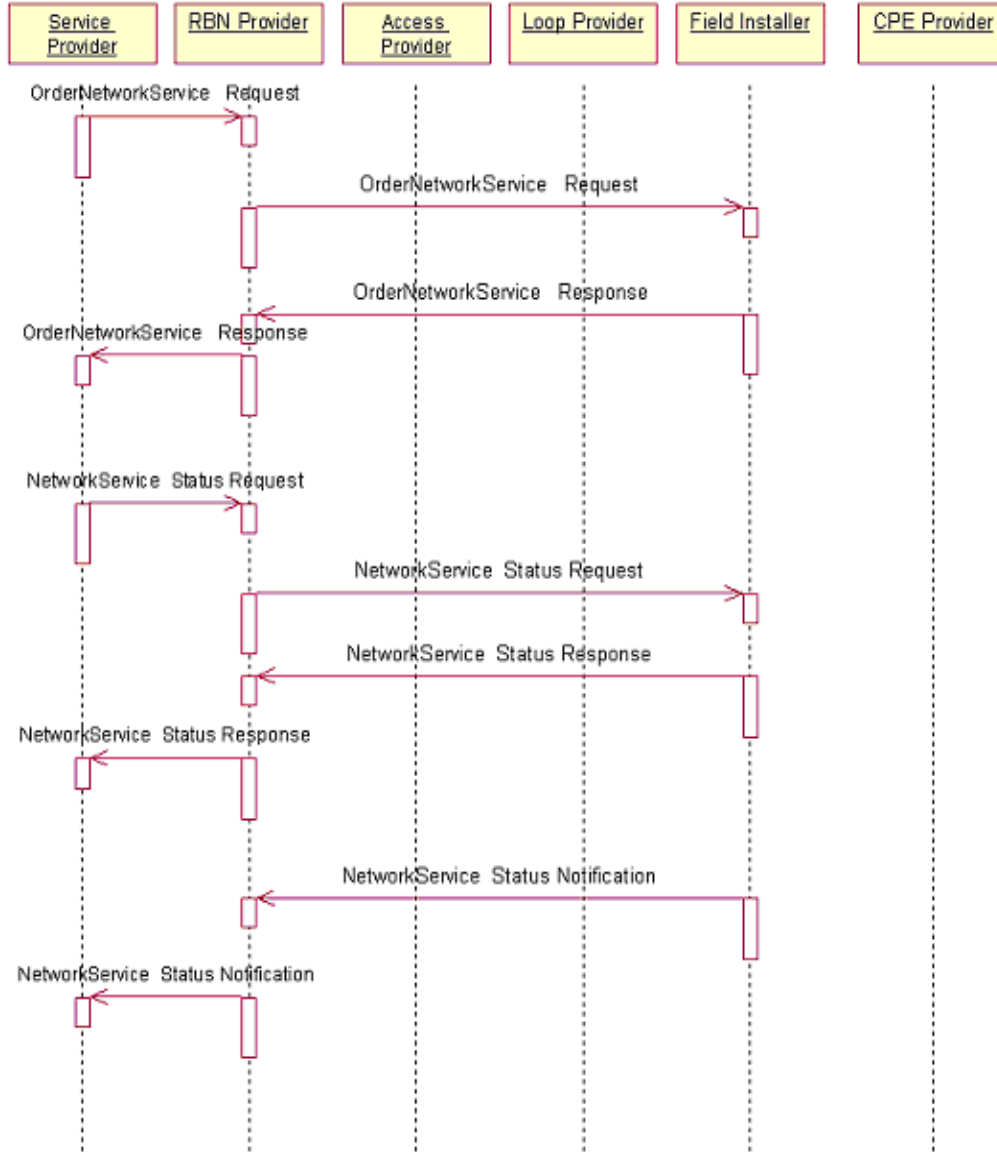


# Service Fulfillment: New Service 4.1.3.1\_1

## Order Network Service

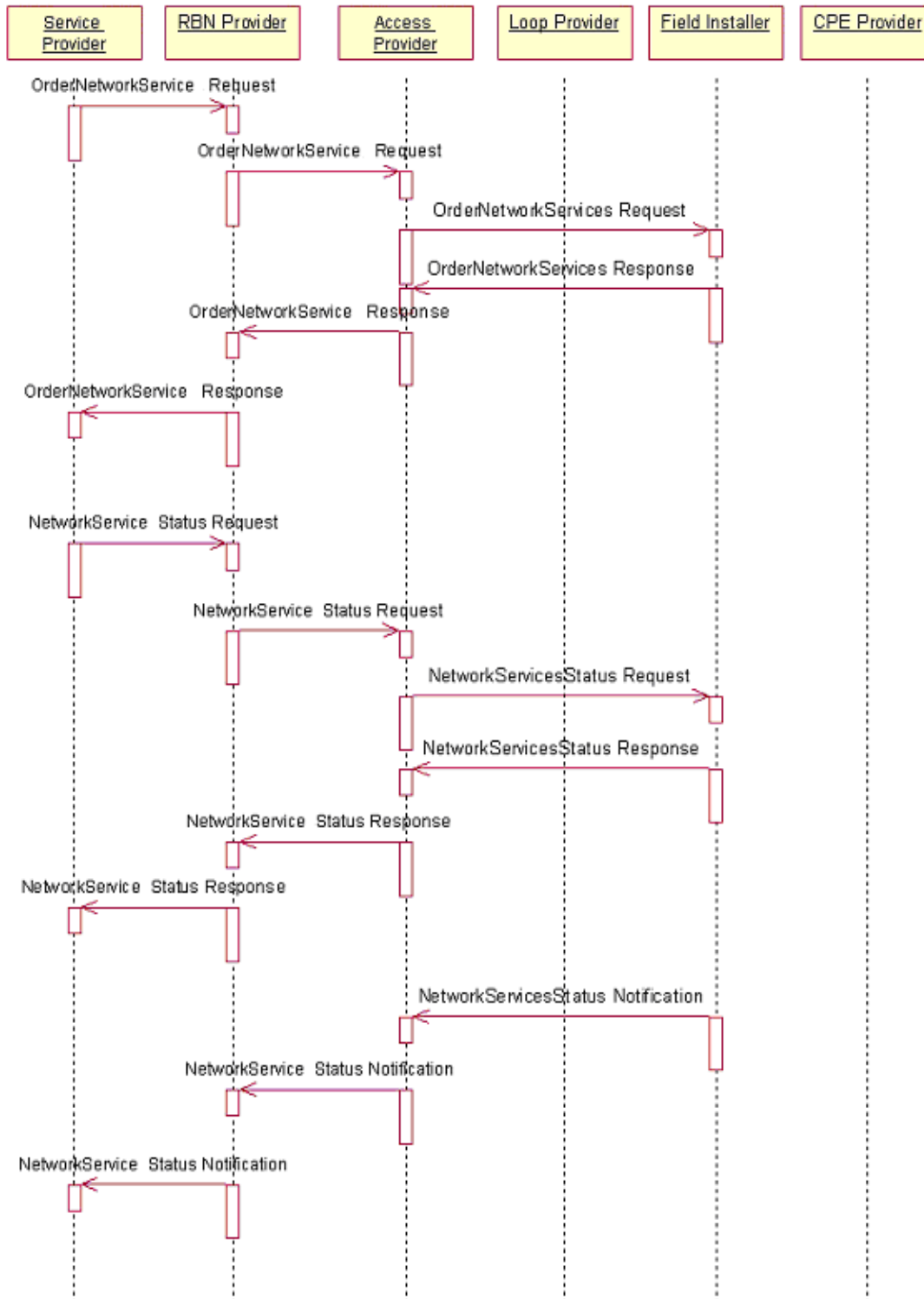


## Service Fulfillment: New Service 4.1.3.2\_2 Order Network Service



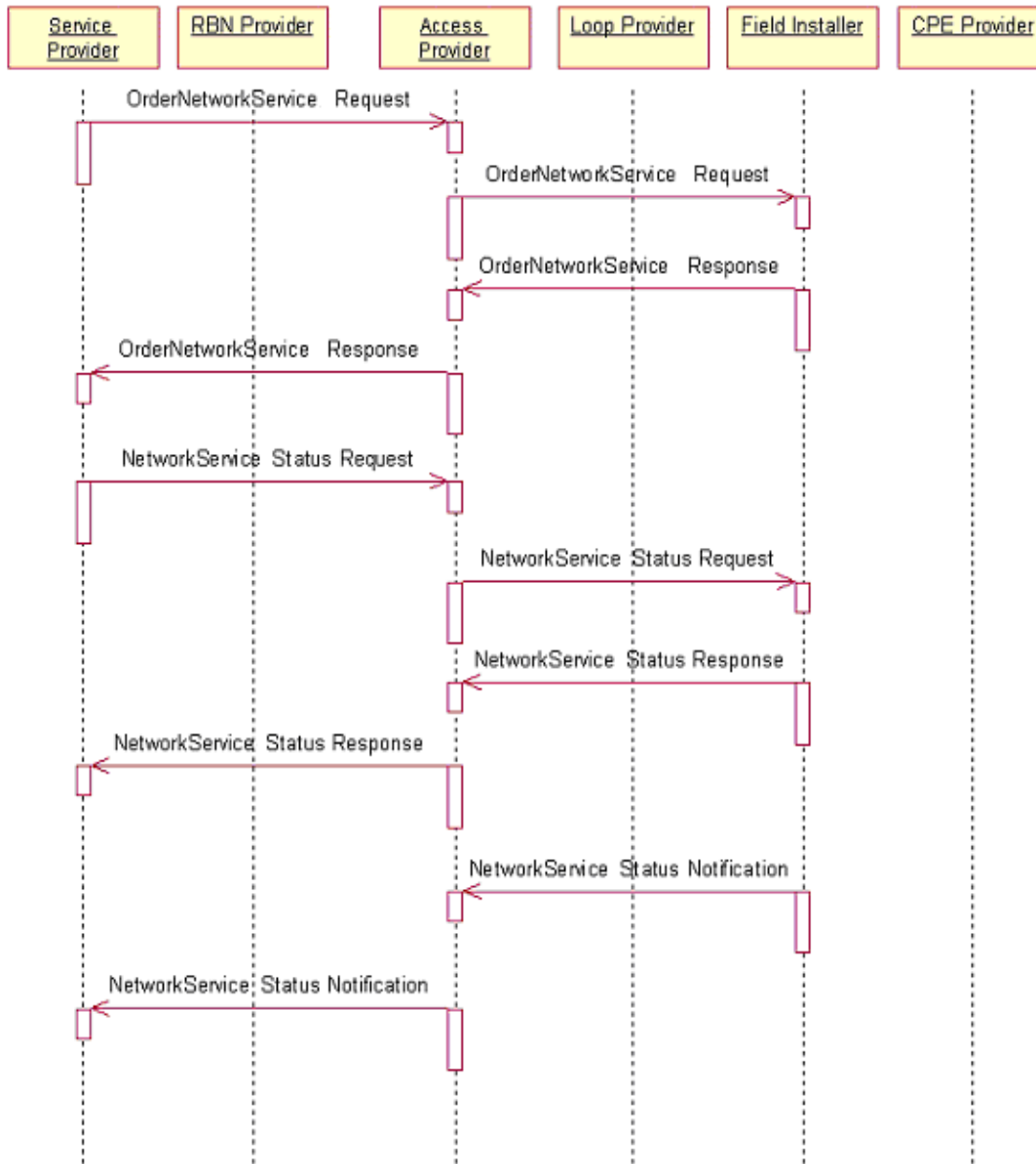
### Service Fulfillment: New Service 4.1.3.2\_3

#### Order Network Service

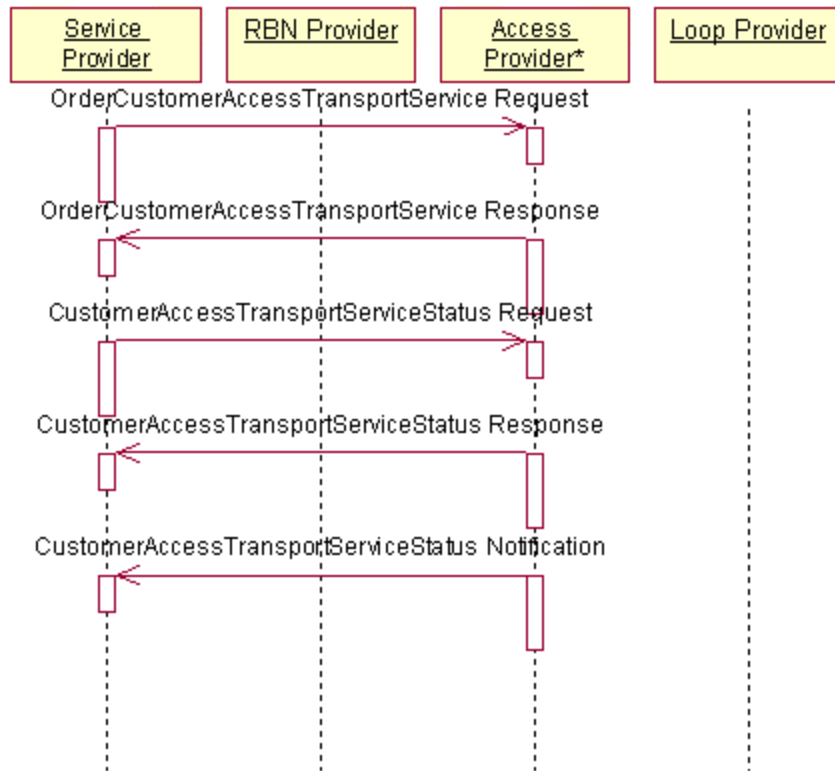


## Service Fulfillment: New Service 4.1.3.2\_4

### Order Network Service

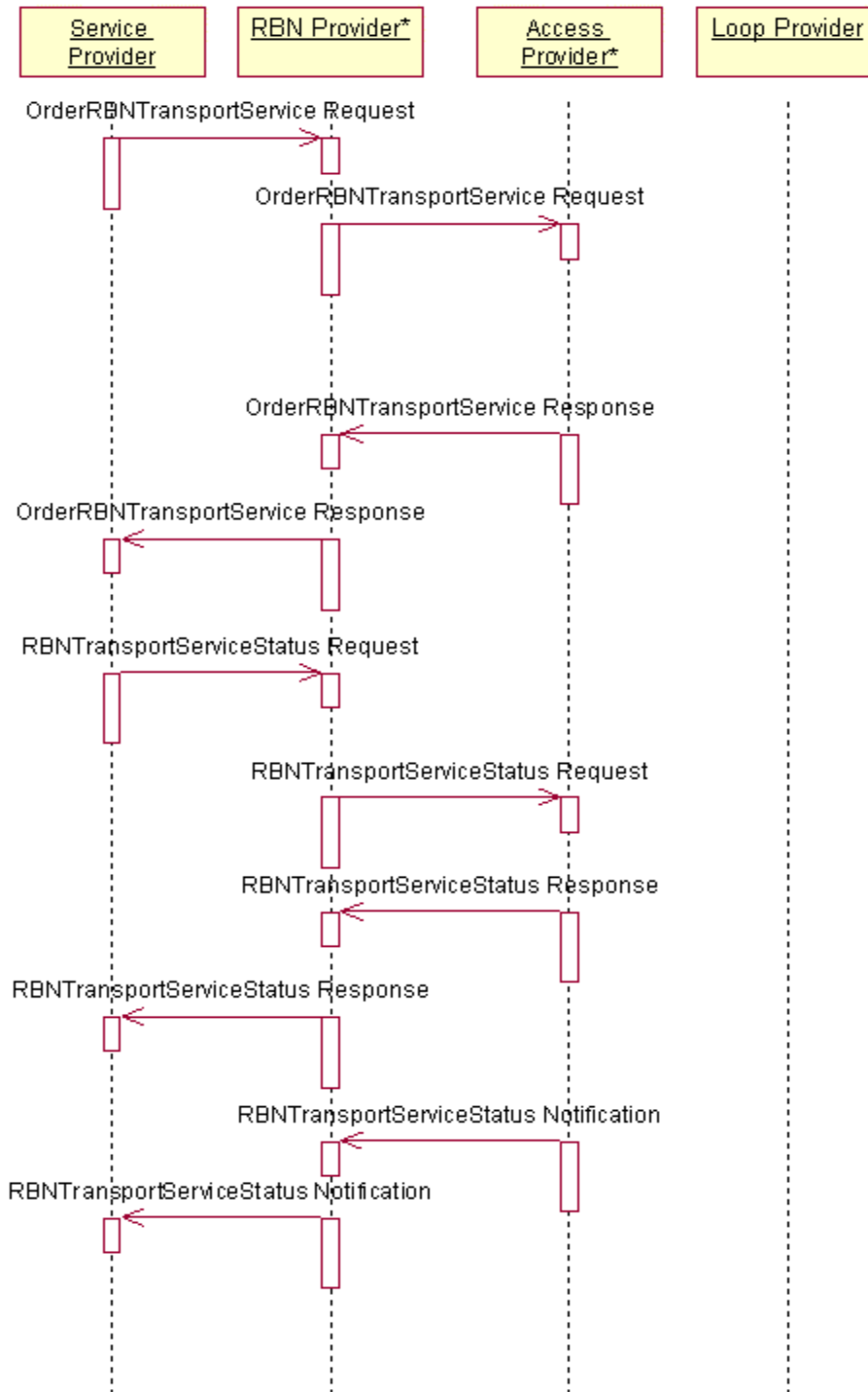


**Service Fulfillment: New Service 4.1.3.3\_1**  
**Order Customer Access Transport Service**



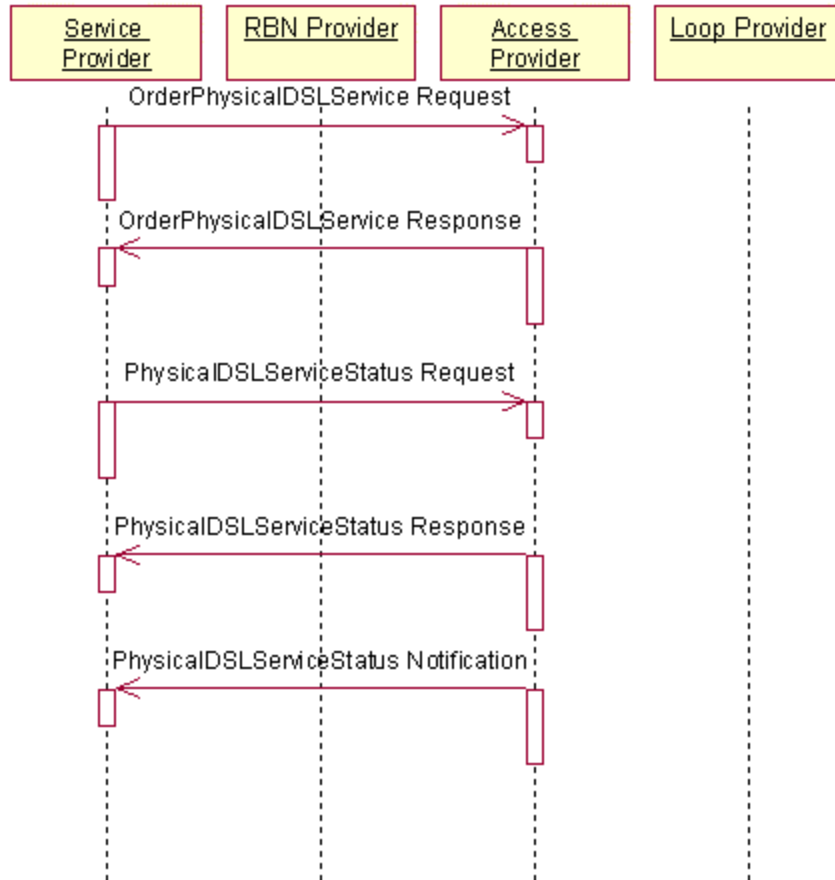


## Service Fulfillment: New Service 4.1.3.4\_1 Order RBN Transport Service



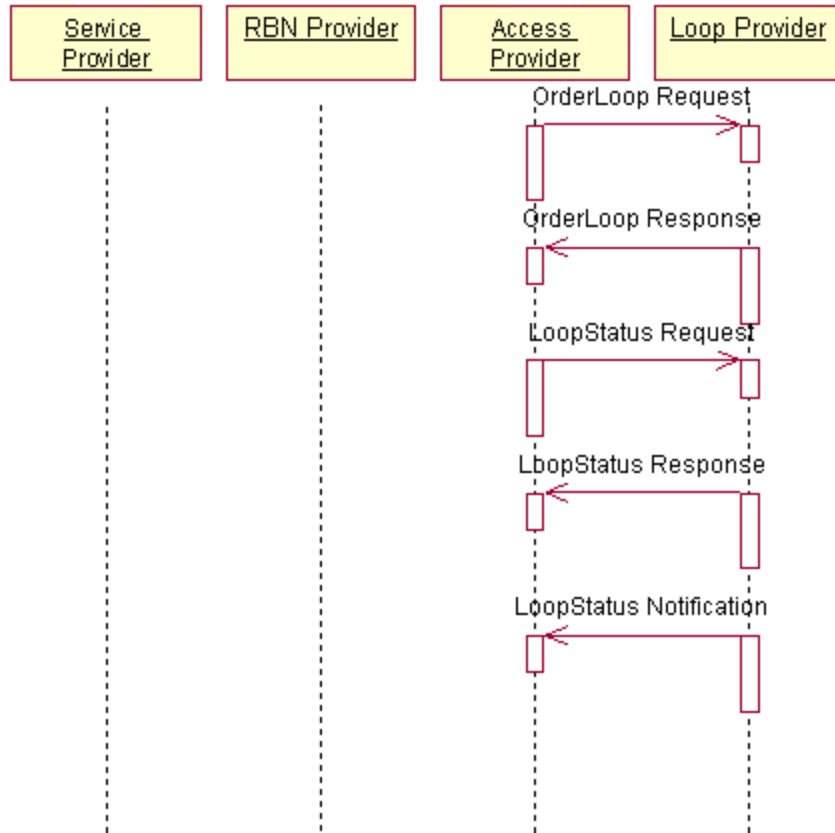
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## Order Physical DSL Service

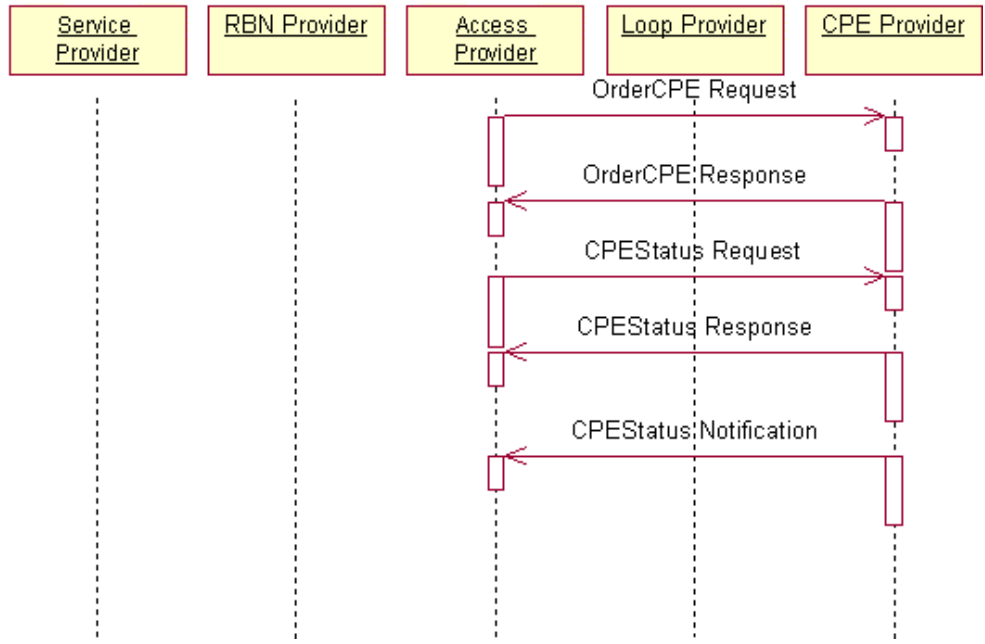


# Service Fulfillment: New Service 4.1.3.6\_1

## Order Loop

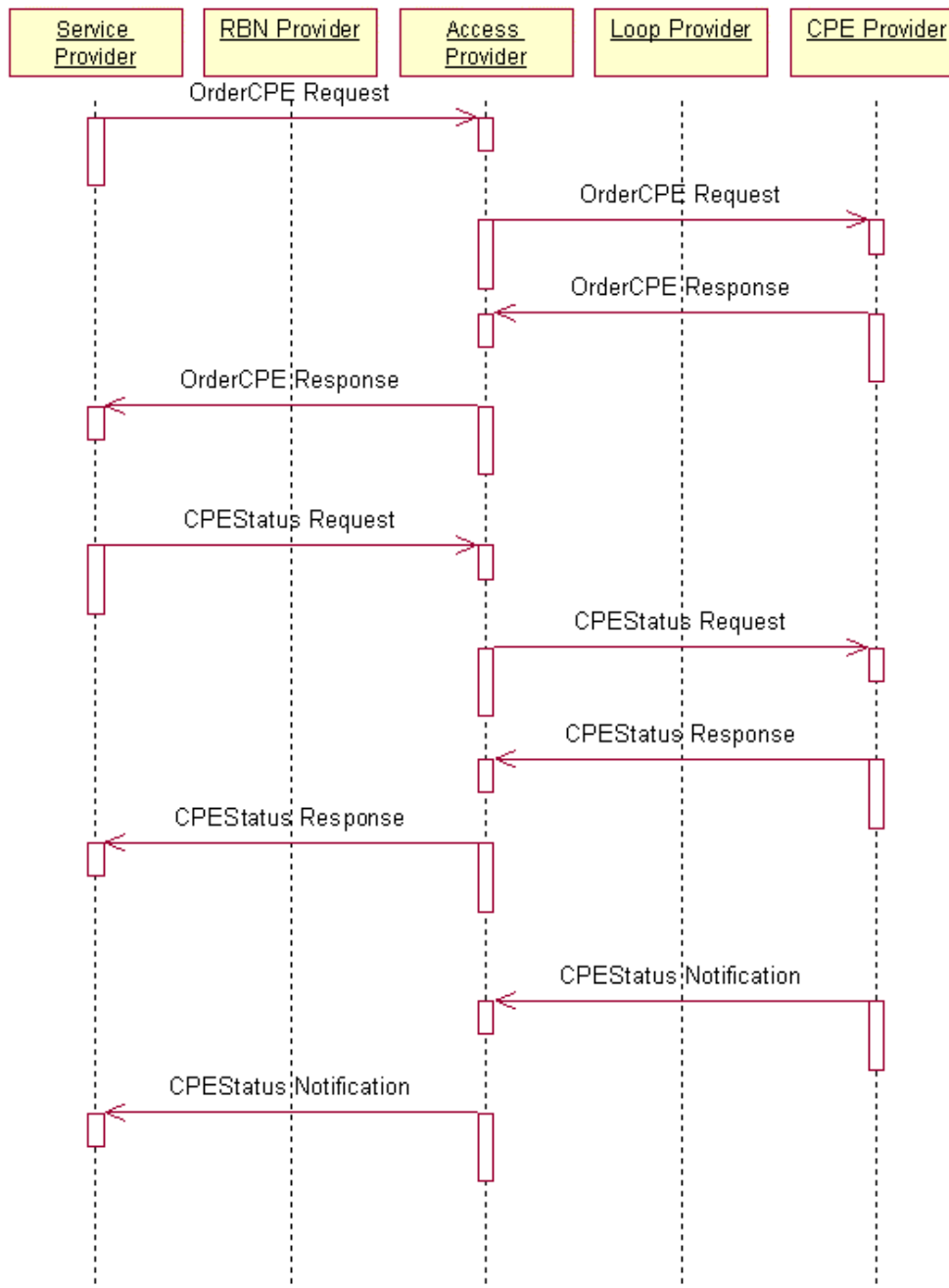


# Service Fulfillment: New Service 4.1.3.7\_1 Order CPE

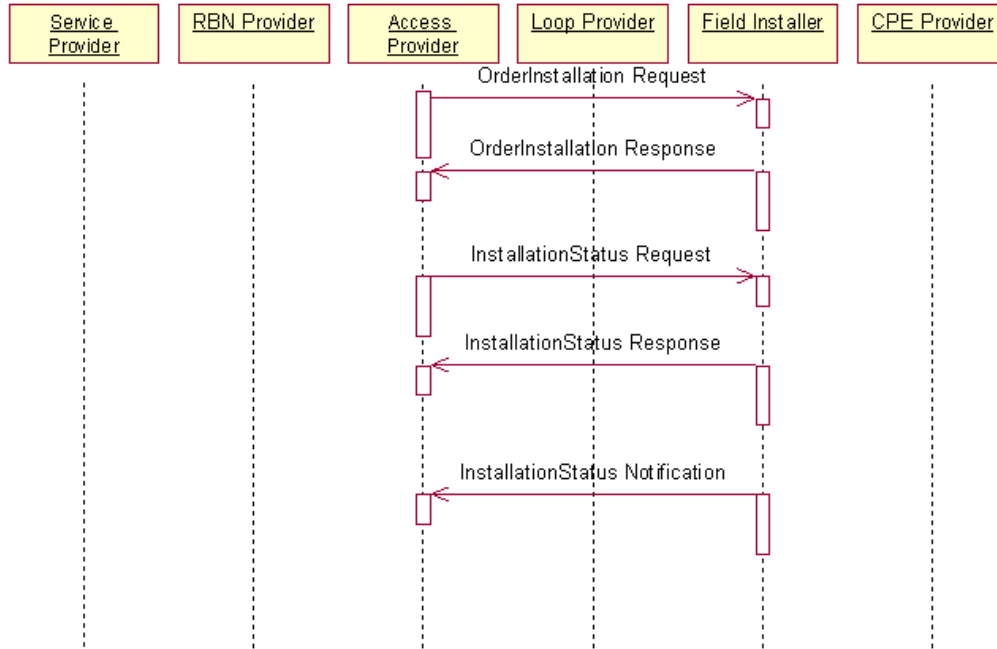


## Service Fulfillment: New Service 4.1.3.7\_2

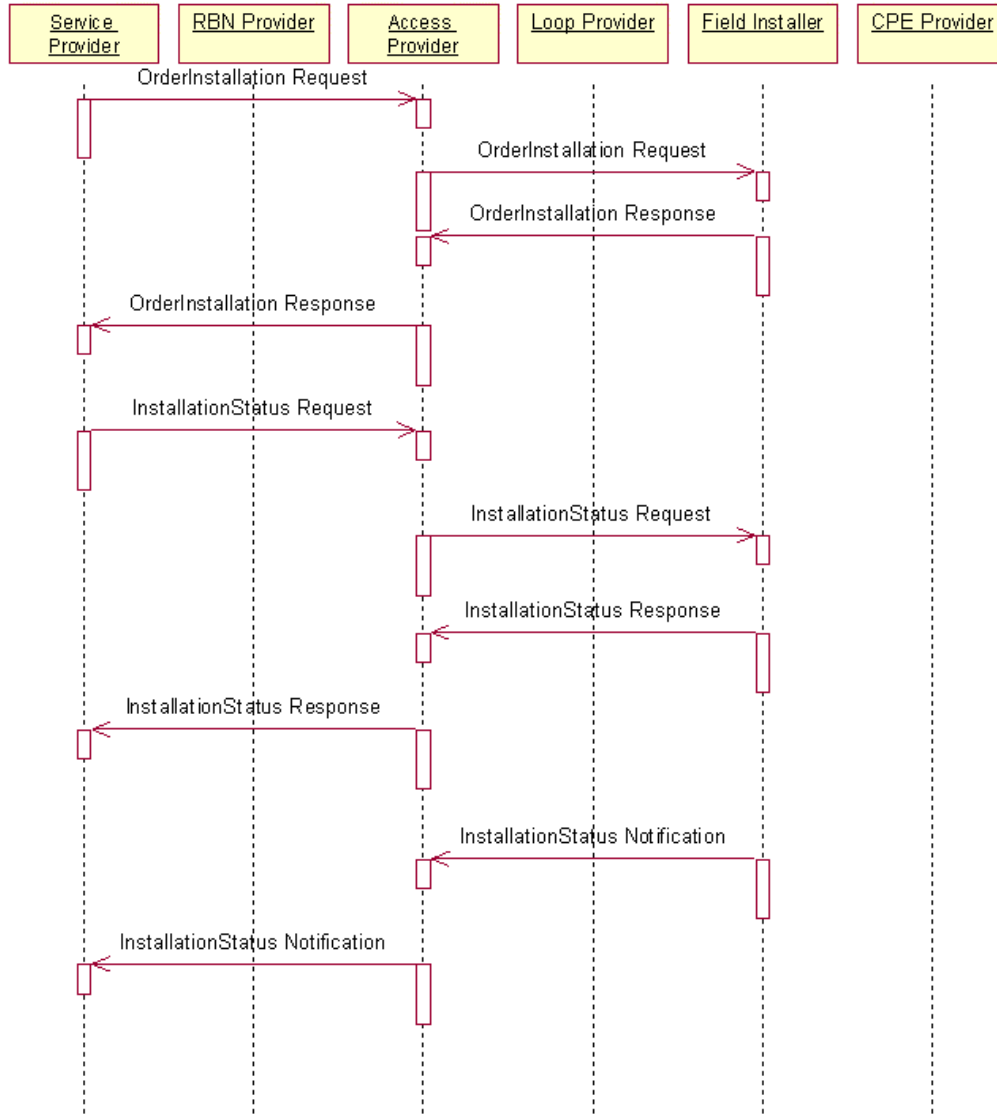
### Order CPE



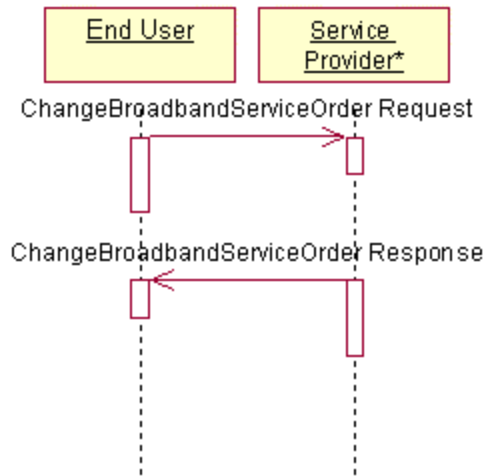
## Service Fulfillment: New Service 4.1.3.8\_1 Order Installation



## Service Fulfillment: New Service 4.1.3.8\_2 Order Installation

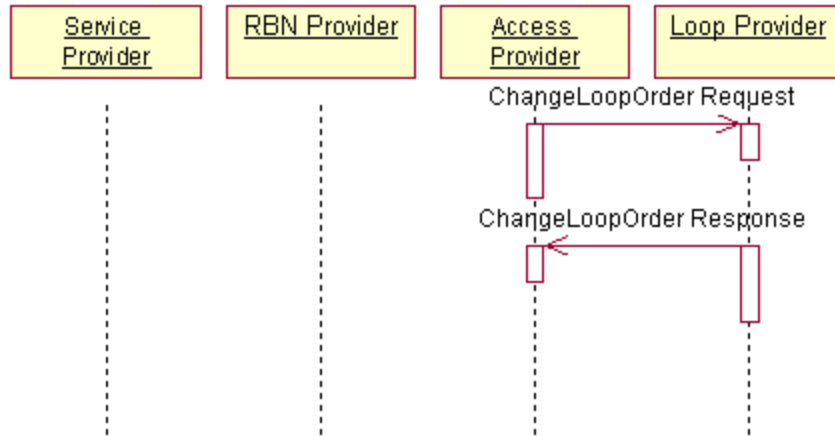


## Service Fulfillment: Modify Pending Order 4.1.4.1\_1 Change Broadband Service Order

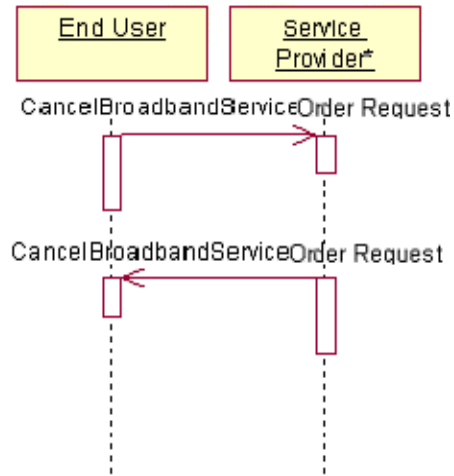




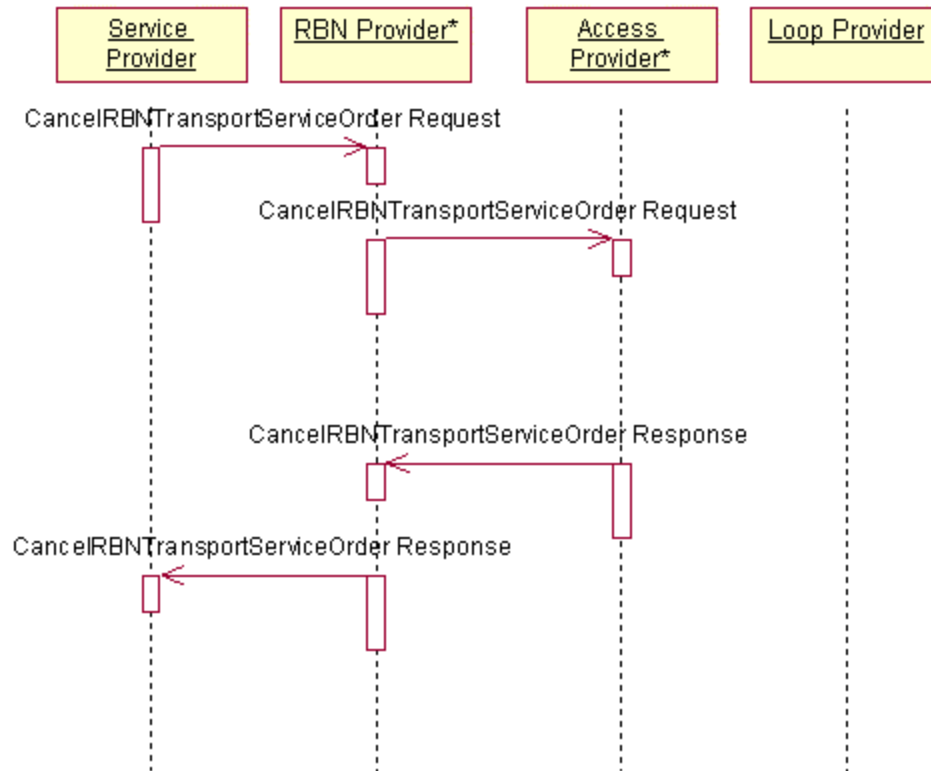
# Service Fulfillment: Modify Pending Order 4.1.4.2\_1 Change Loop Order



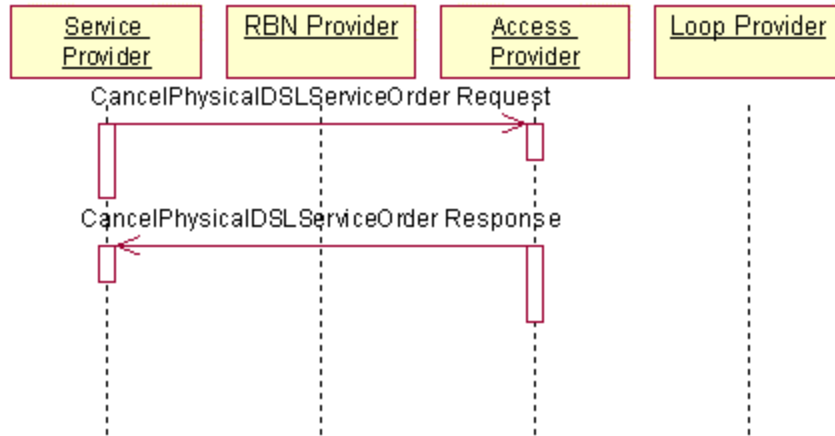
**Service Fulfillment: Cancel Order 4.1.5.1\_1**  
**Cancel Broadband Service Order**



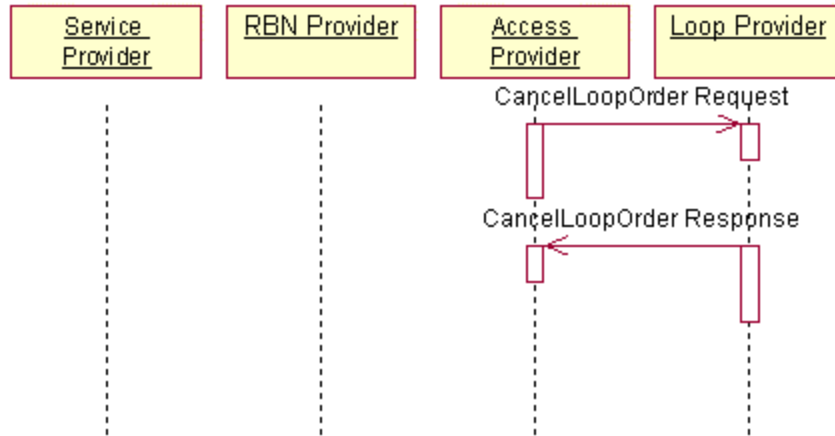
## Service Fulfillment: Cancel Order 4.1.5.2\_1 Cancel RBN Transport Service Order



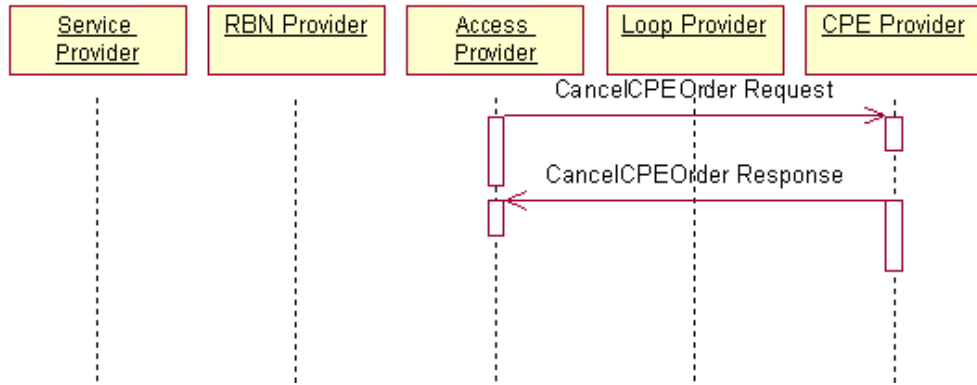
**Service Fulfillment: Cancel Order 4.1.5.3\_1**  
**Cancel Physical DSL Service Order**



**Service Fulfillment: Cancel Order 4.1.5.4\_1**  
**Cancel Loop Order**

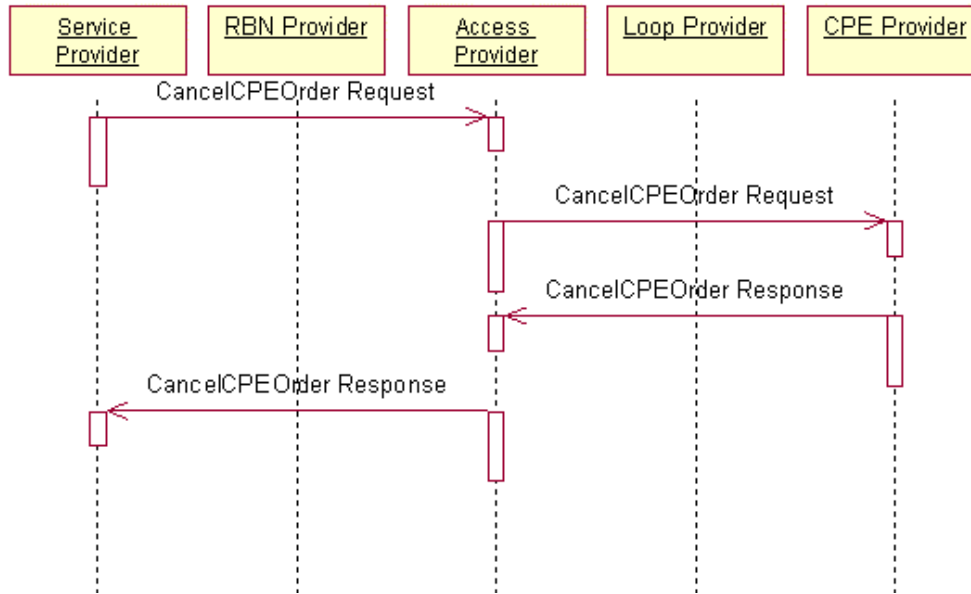


**Service Fulfillment: Cancel Order 4.1.5.5\_1**  
**Cancel CPE Order**

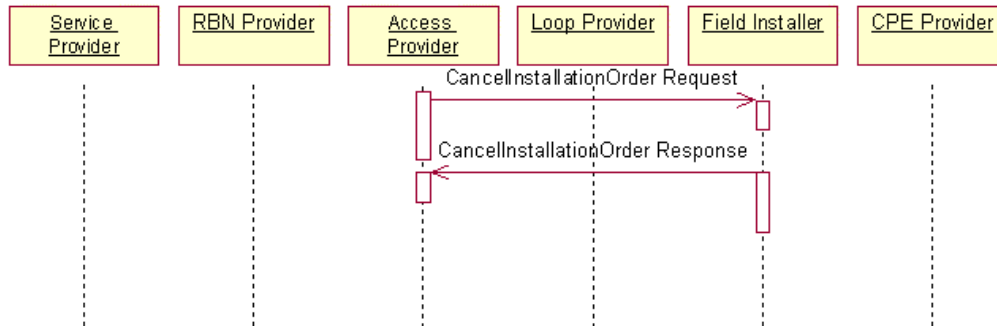


## Service Fulfillment: Cancel Order 4.1.5.5\_2

### Cancel CPE Order



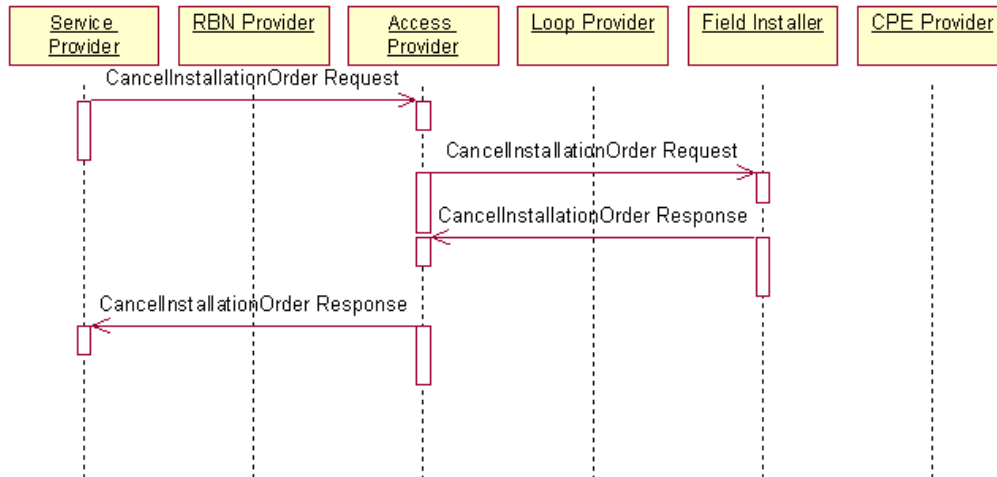
## Service Fulfillment: Cancel Order 4.1.5.6\_1 Cancel Installation Order



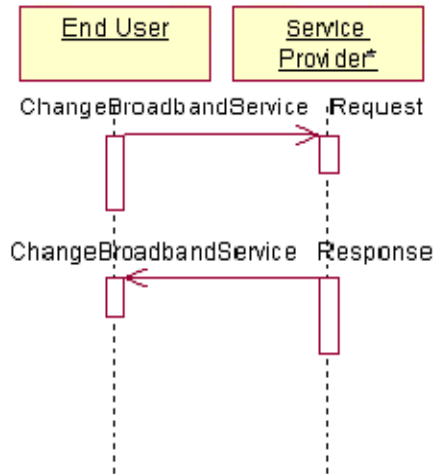


## Service Fulfillment: Cancel Order 4.1.5.6\_2

### Cancel Installation Order

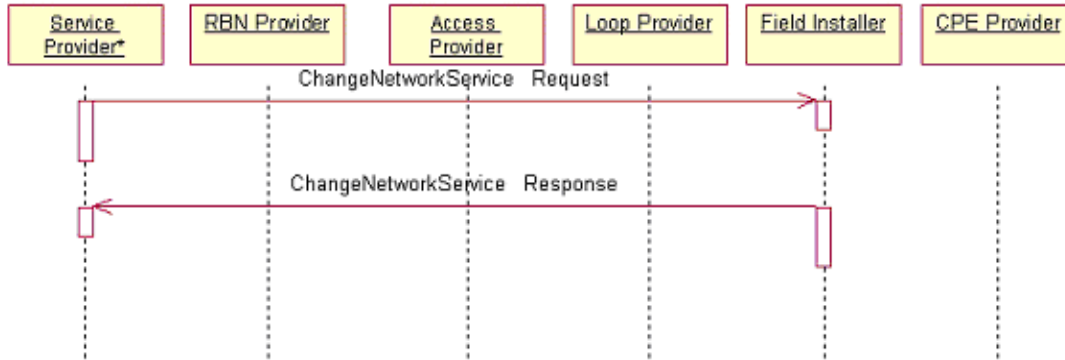


**Service Fulfillment: Change Service 4.1.6.1\_1**  
**Change Broadband Service**

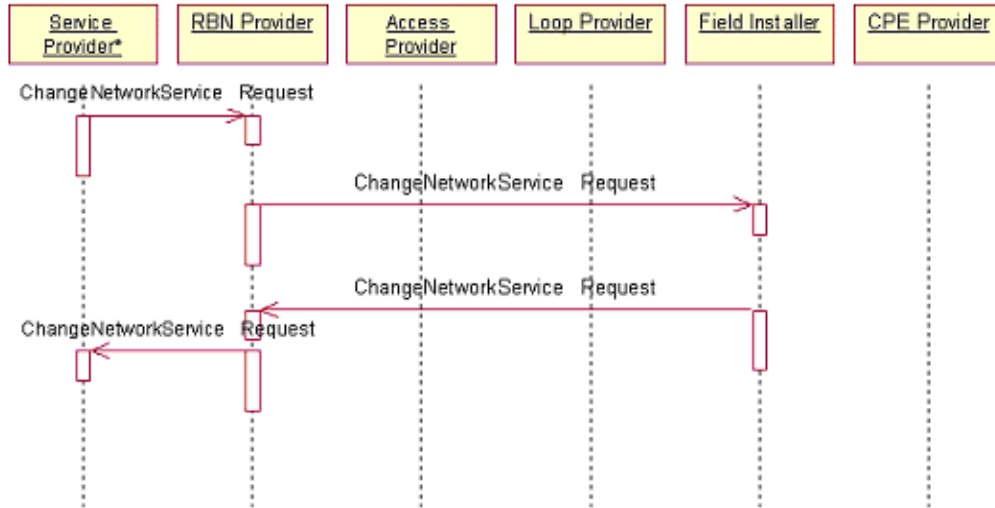


# Service Fulfillment: Change Service 4.1.6.2\_1

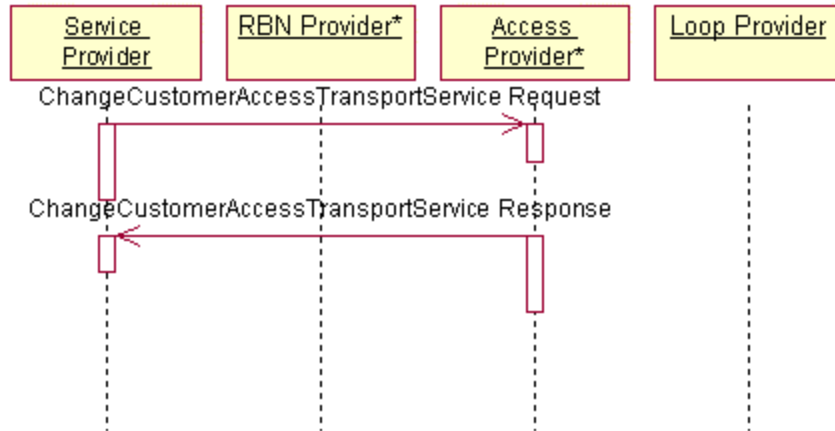
## Change Network Service



## Service Fulfillment: Change Service 4.1.6.2\_2 Change Network Service

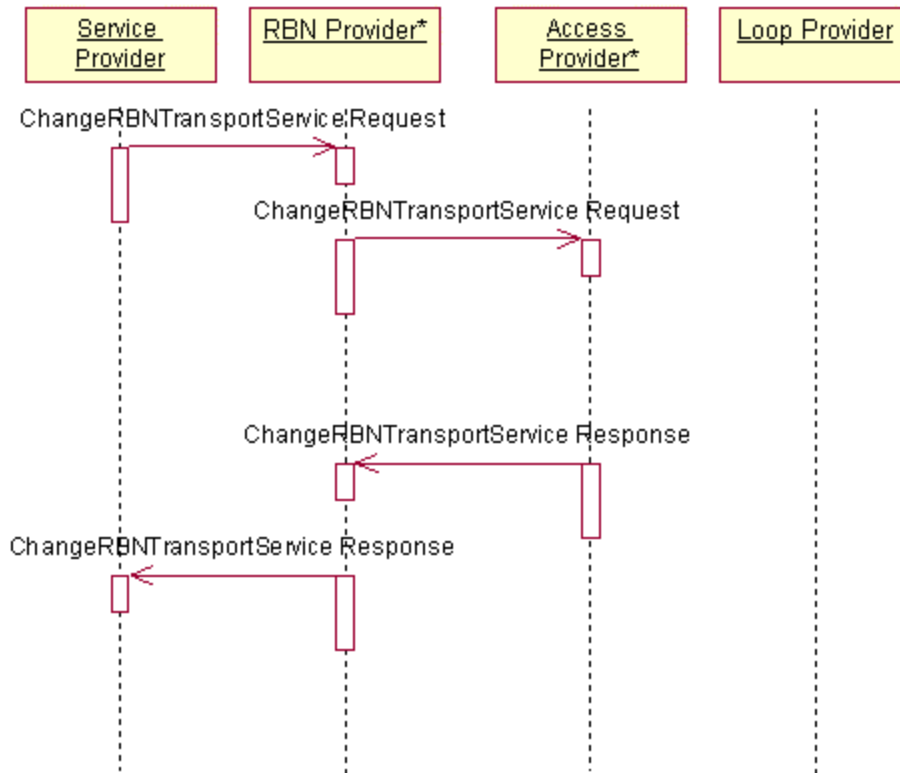


### Service Fulfillment: Change Service 4.1.6.3\_1 Change Customer Access Transport Service

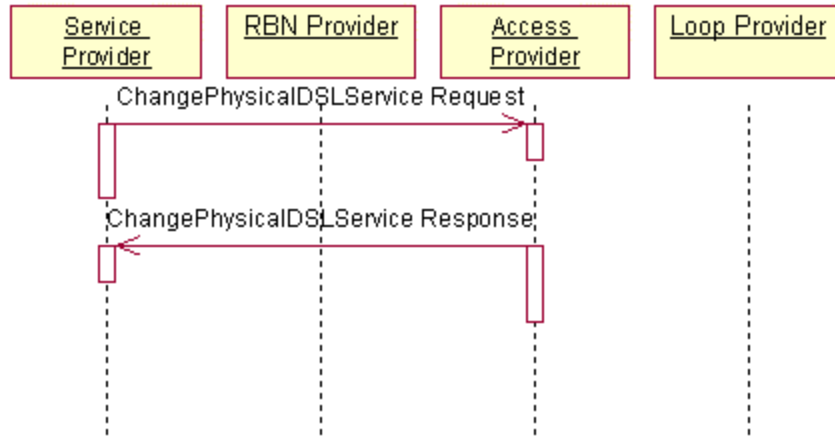


# Service Fulfillment: Change Service 4.1.6.4\_1

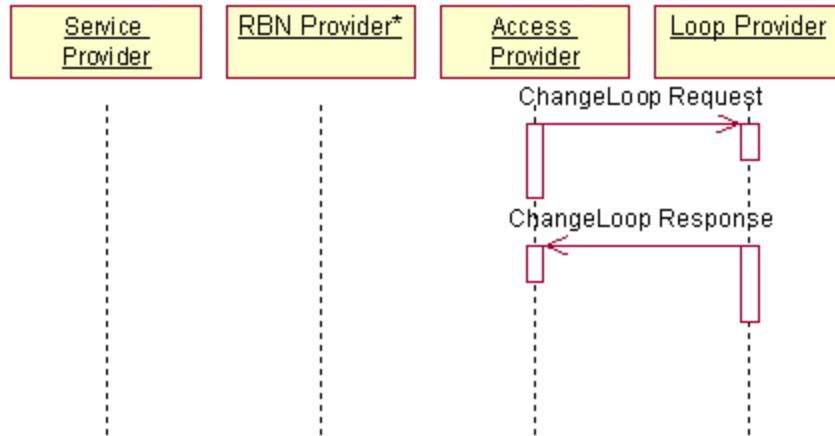
## Change RBN Transport Service



**Service Fulfillment: Change Service 4.1.6.5\_1**  
**Change Physical DSL Service**

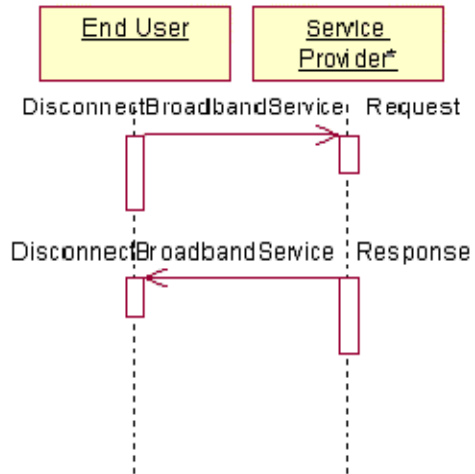


## Service Fulfillment: Change Service 4.1.6.6\_1 Change Loop

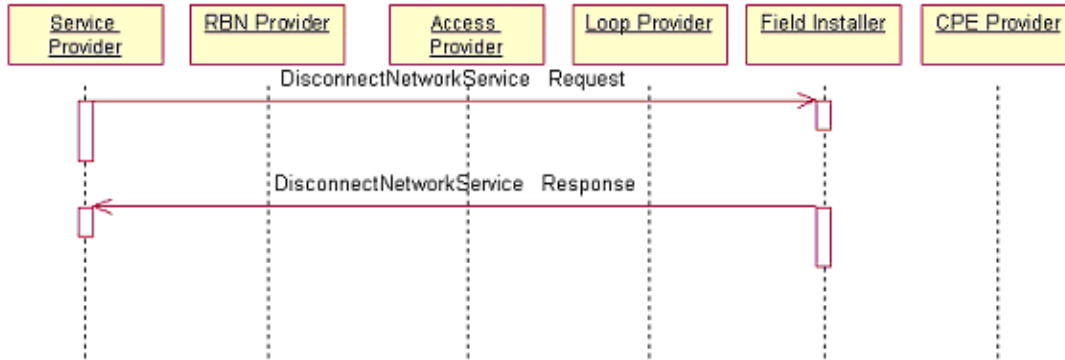




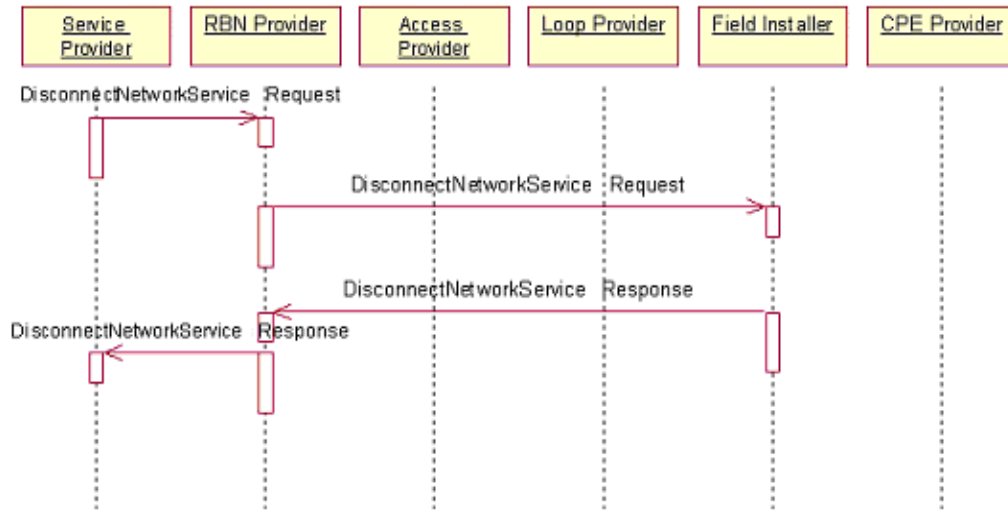
## Service Fulfillment: Disconnect Service 4.1.7.1\_1 Disconnect Broadband Service



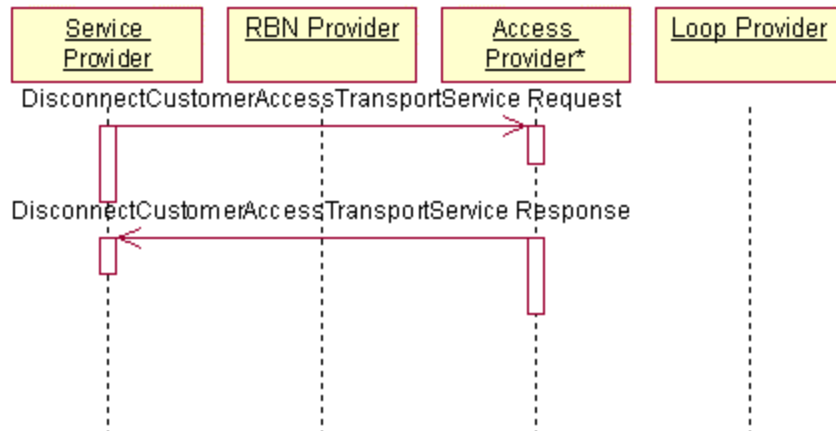
## Service Fulfillment: Disconnect Service 4.1.7.2\_1 Disconnect Network Service



## Service Fulfillment: Disconnect Service 4.1.7.2\_2 Disconnect Network Service

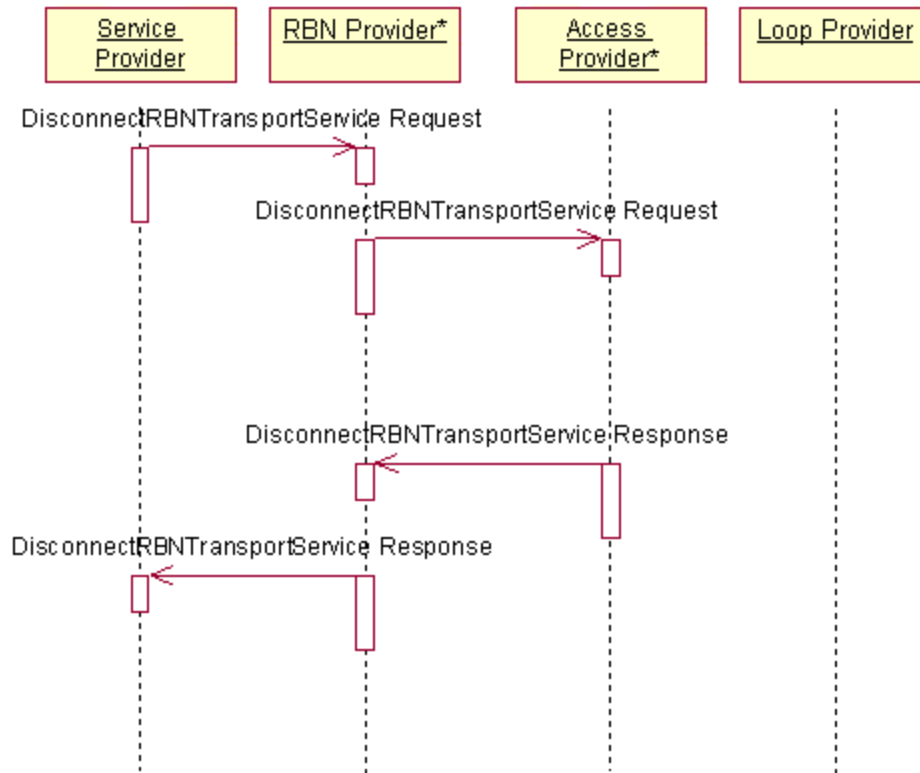


### Service Fulfillment: Disconnect Service 4.1.7.3\_1 Disconnect Customer Access Transport Service

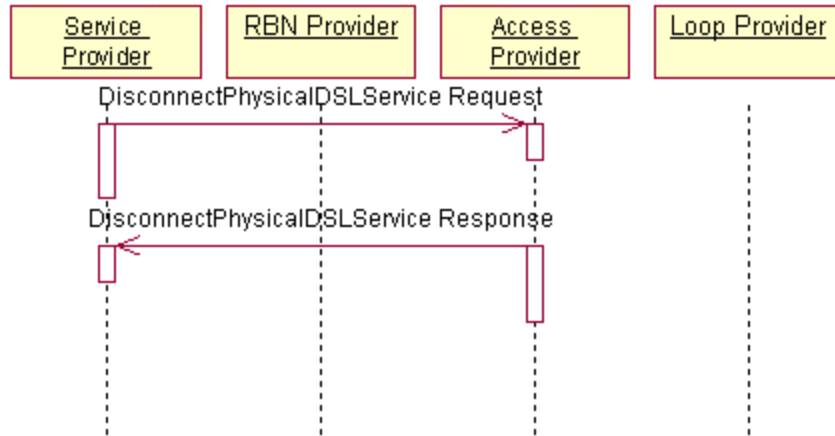


# Service Fulfillment: Disconnect Service 4.1.7.4\_1

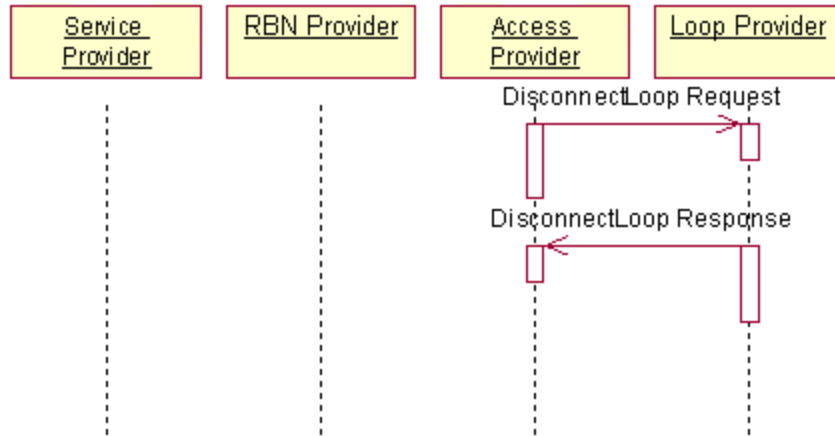
## Disconnect RBN Transport Service



## Service Fulfillment: Disconnect Service 4.1.7.5\_1 Disconnect Physical DSL Service

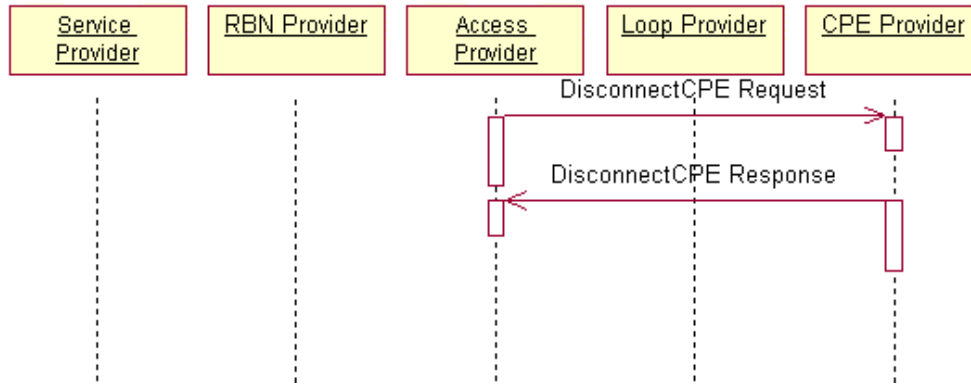


## Service Fulfillment: Disconnect Service 4.1.7.6\_1 Disconnect Loop



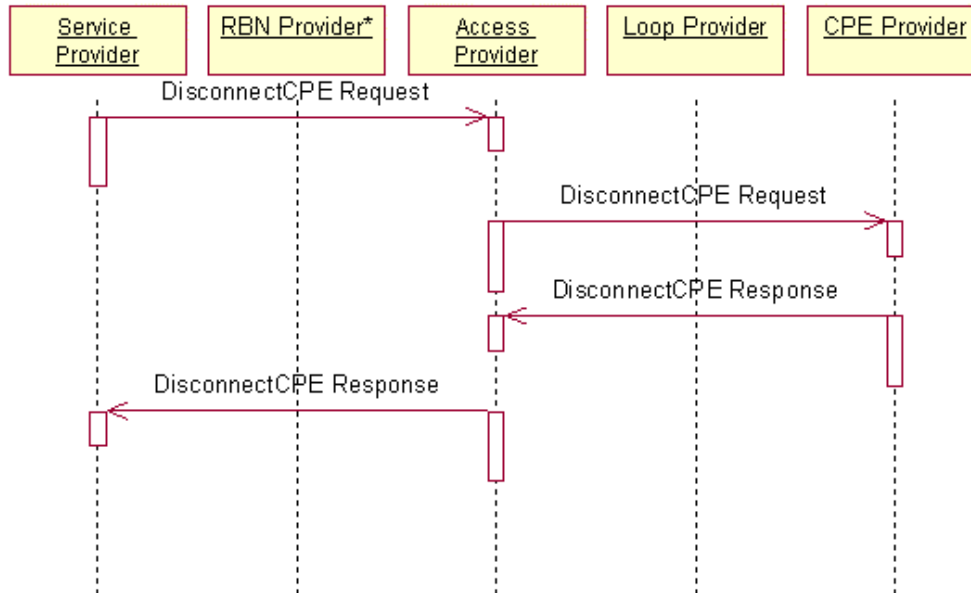
# Service Fulfillment: Disconnect Service 4.1.7.7\_1

## Disconnect CPE

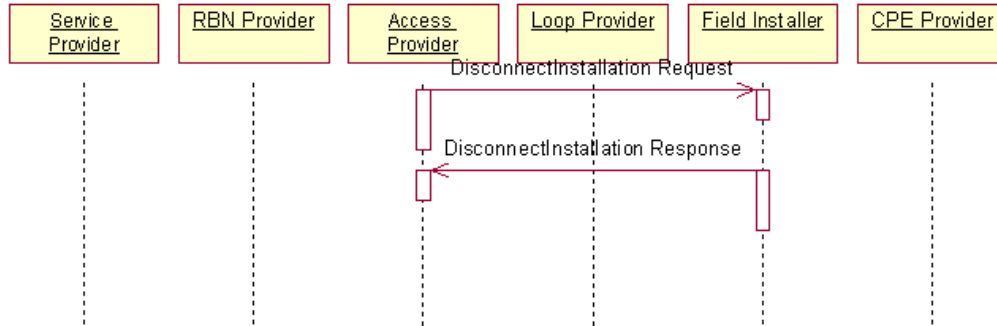




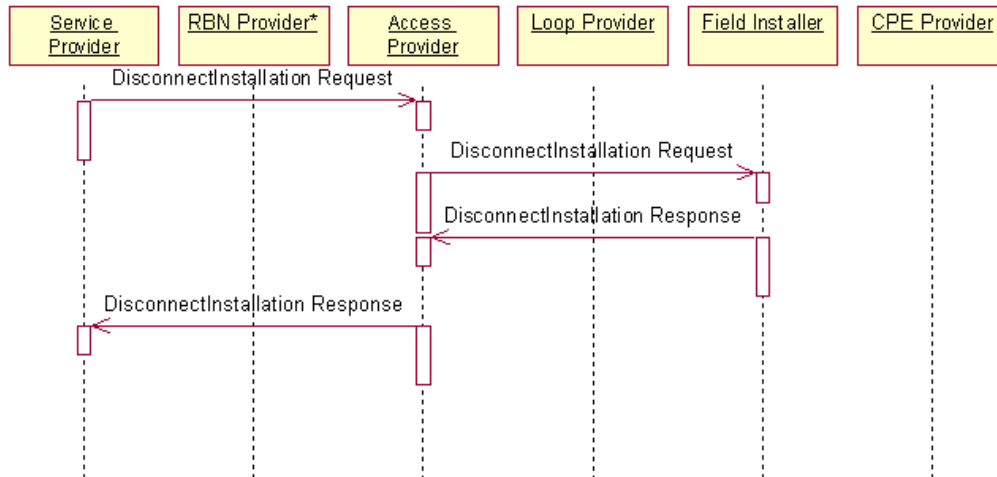
## Service Fulfillment: Disconnect Service 4.1.7.7\_2 Disconnect CPE



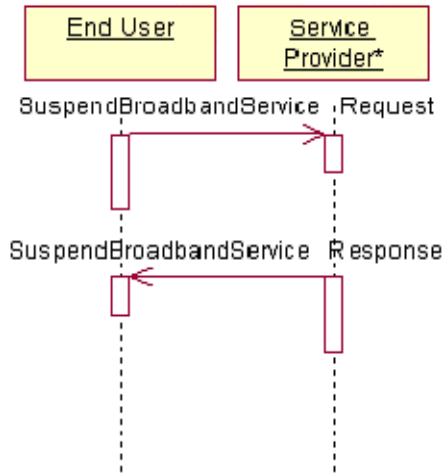
## Service Fulfillment: Disconnect Service 4.1.7.8\_1 Disconnect Installation



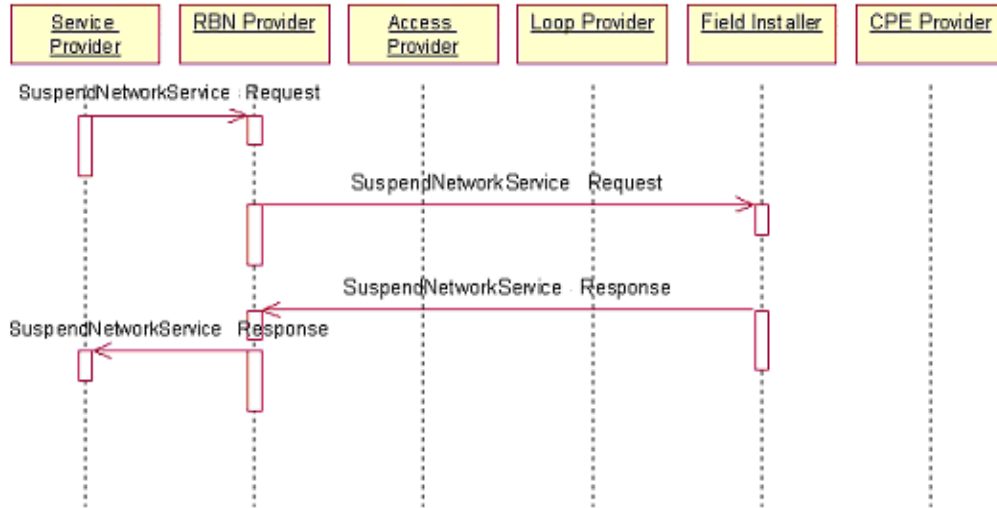
## Service Fulfillment: Disconnect Service 4.1.7.8\_2 Disconnect Installation



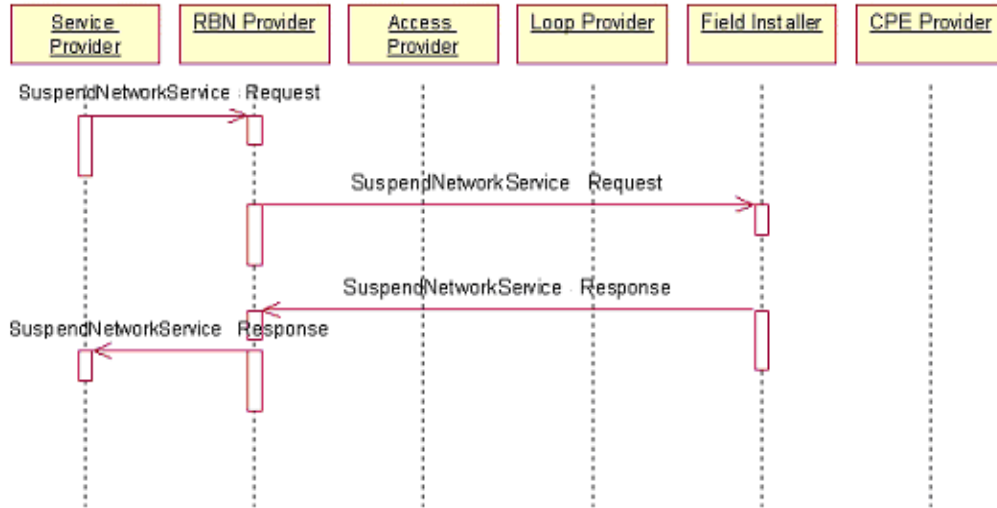
## Service Fulfillment: Suspend Service 4.1.8.1\_1 Suspend Broadband Service



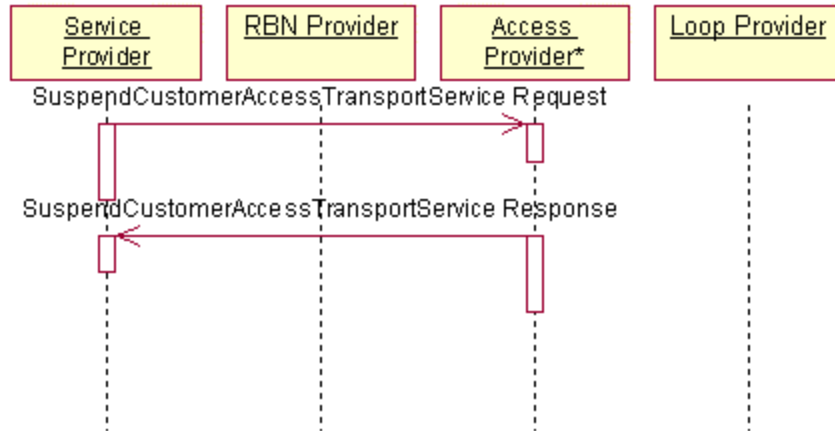
## Service Fulfillment: Suspend Service 4.1.8.2\_1 Suspend Network Service



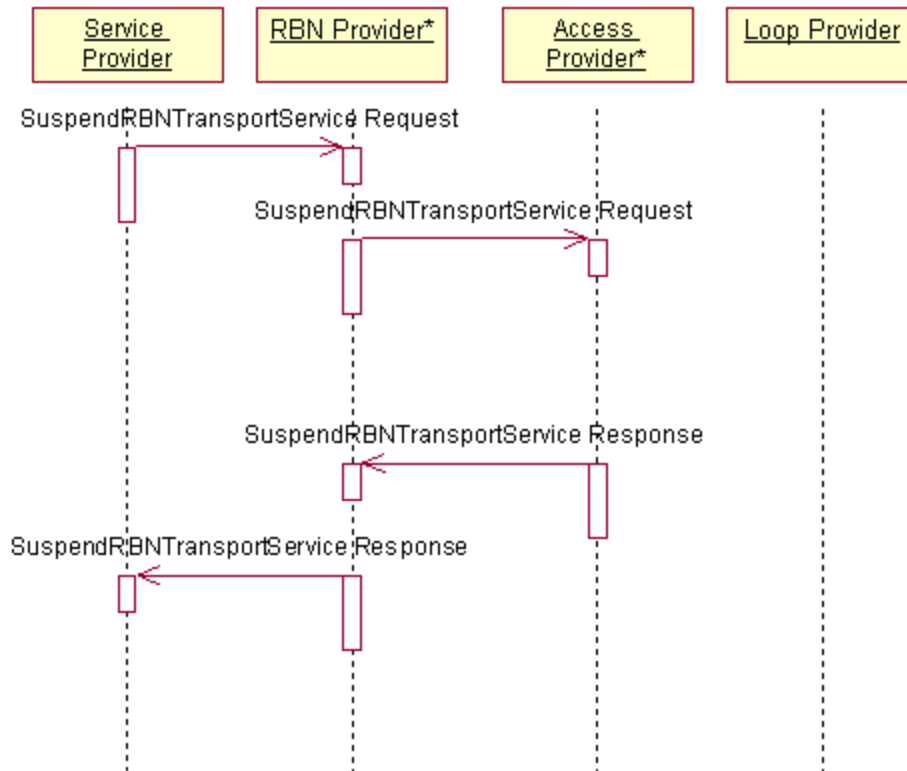
## Service Fulfillment: Suspend Service 4.1.8.2\_2 Suspend Network Service



### Service Fulfillment: Suspend Service 4.1.8.3\_1 Suspend Customer Access Transport Service

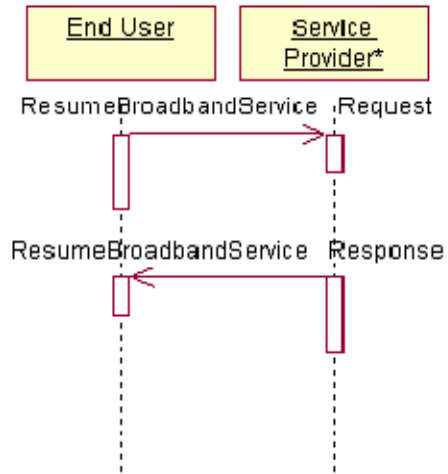


## Service Fulfillment: Suspend Service 4.1.8.4\_1 Suspend RBN Transport Service

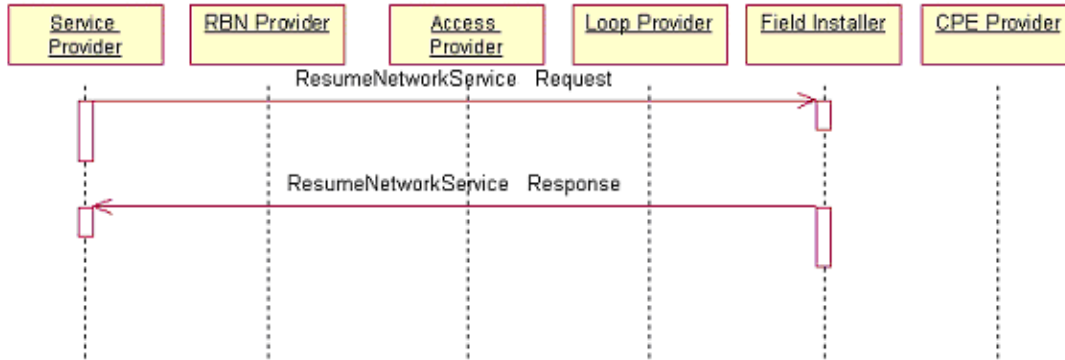




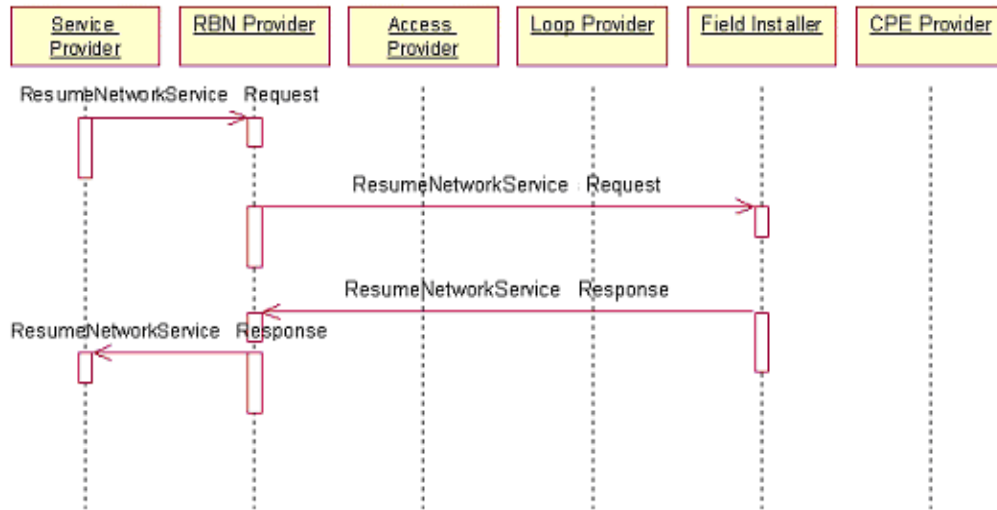
## Service Fulfillment: Resume Service 4.1.9.1\_1 Resume Broadband Service



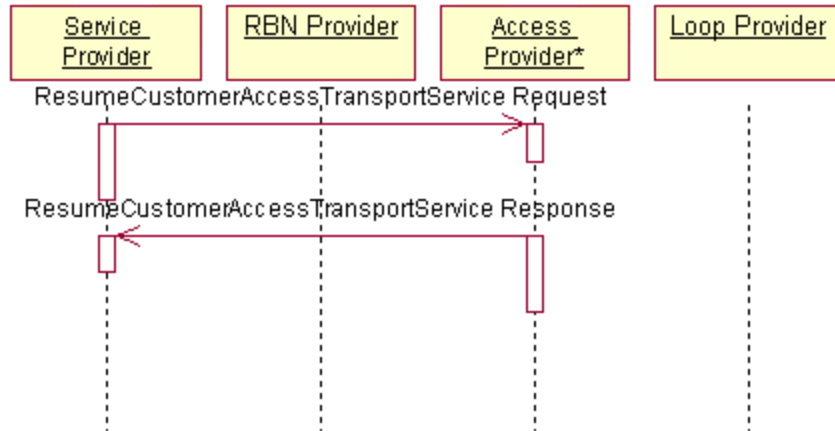
## Service Fulfillment: Resume Service 4.1.9.2\_1 Suspend Network Service



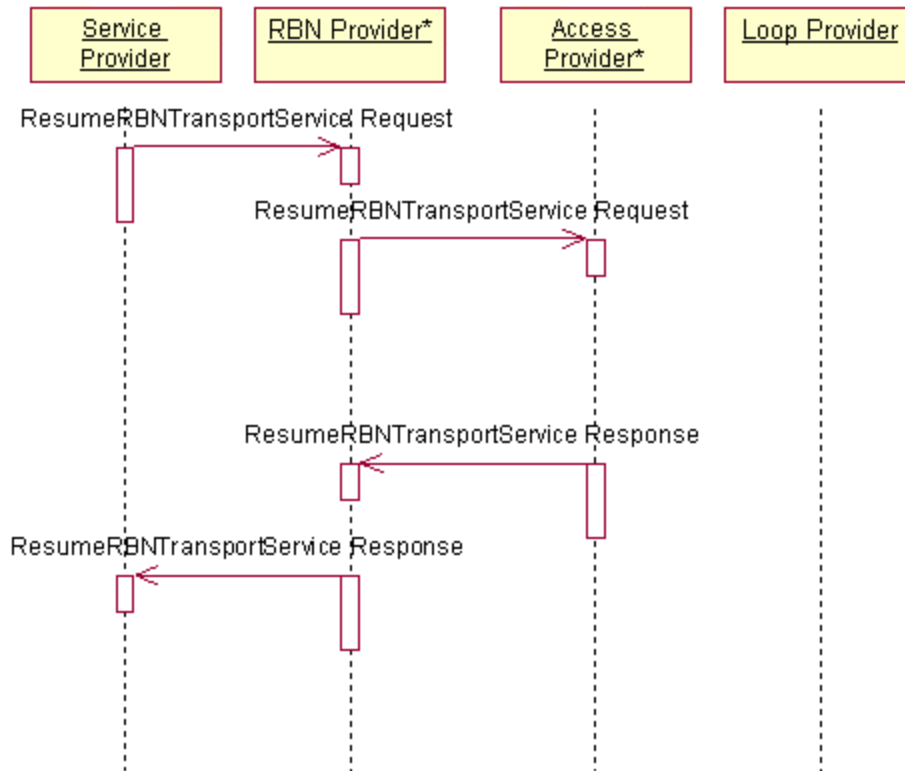
## Service Fulfillment: Resume Service 4.1.9.2\_2 Resume Network Service



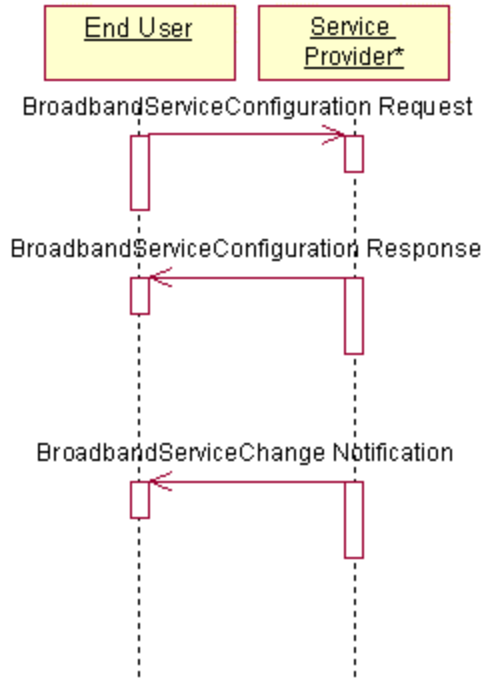
**Service Fulfillment: Resume Service 4.1.9.3\_1**  
**Resume Customer Access Transport Service**



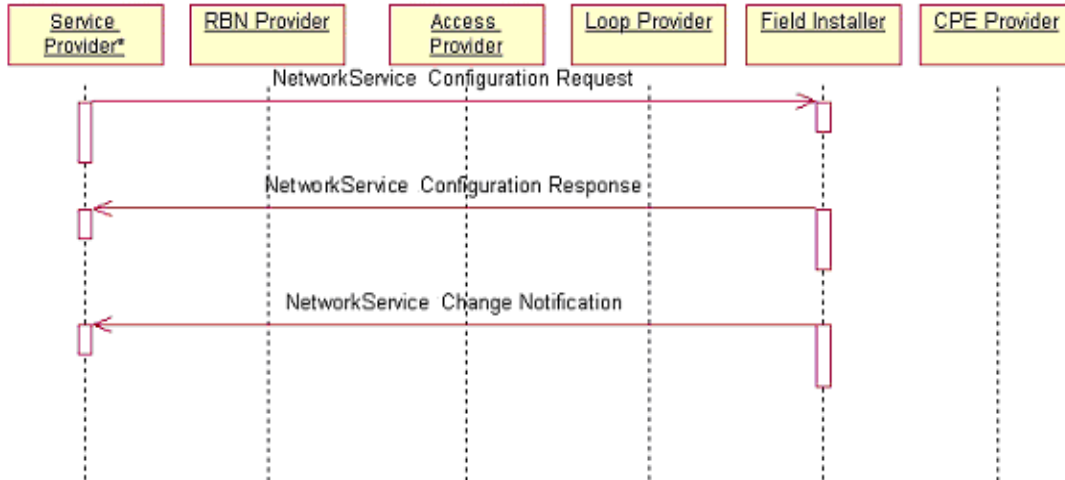
## Service Fulfillment: Resume Service 4.1.9.4\_1 Resume RBN Transport Service



## Service Fulfillment: Service Configuration 4.1.10.1\_1 Broadband Service Configuration

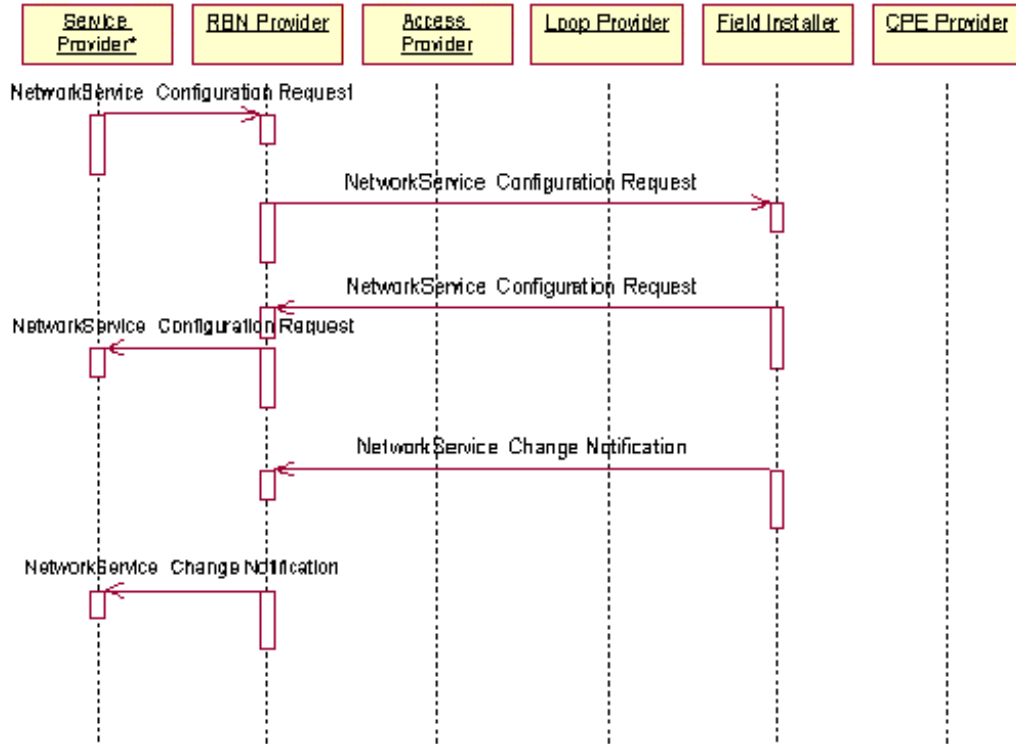


## Service Fulfillment: Service Configuration 4.1.10.2\_1 Network Service Configuration



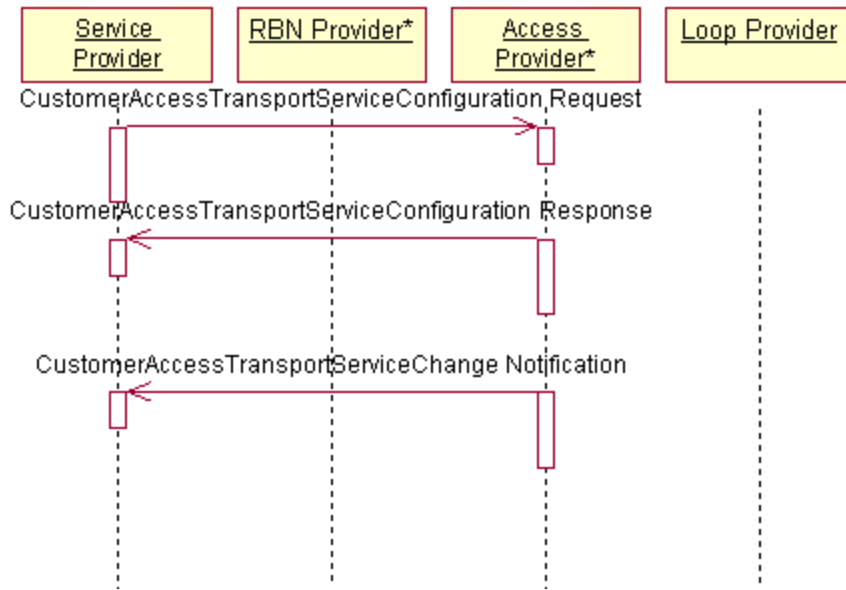
# Service Fulfillment: Service Configuration 4.1.10.2\_1

## Network Service Configuration

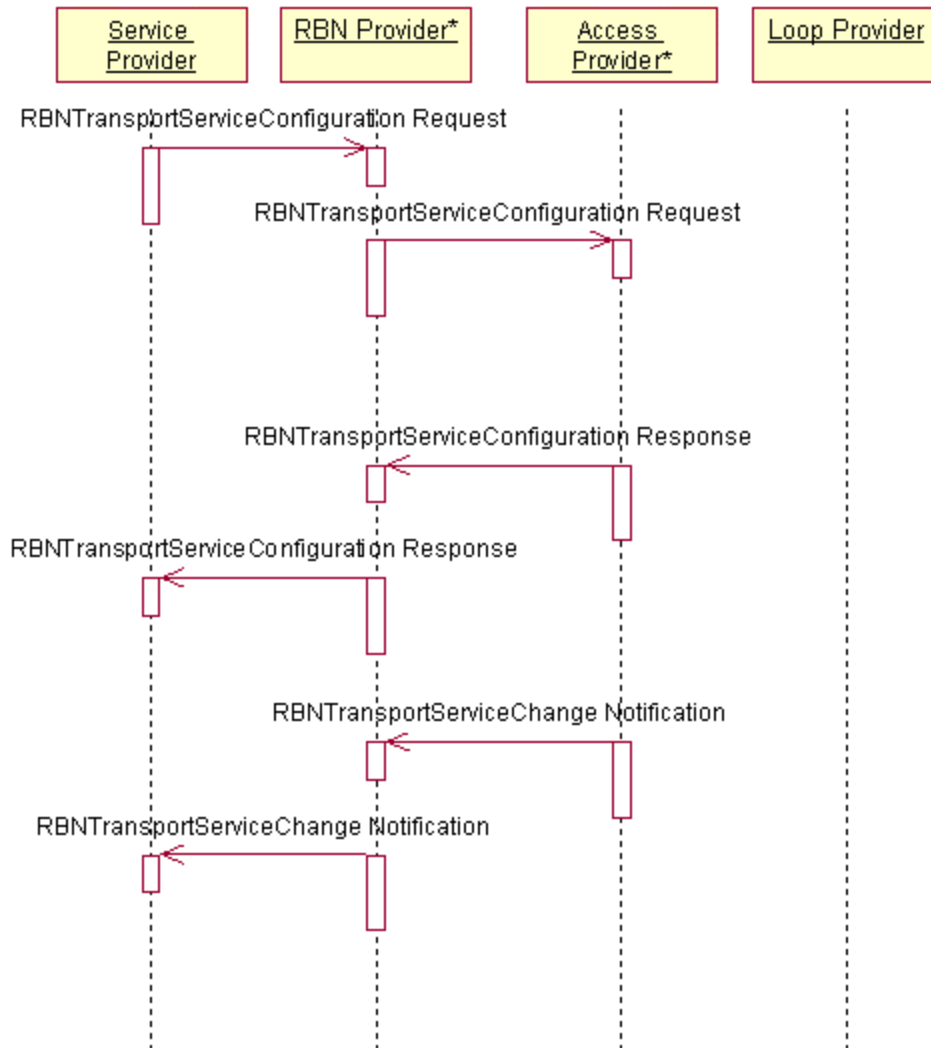




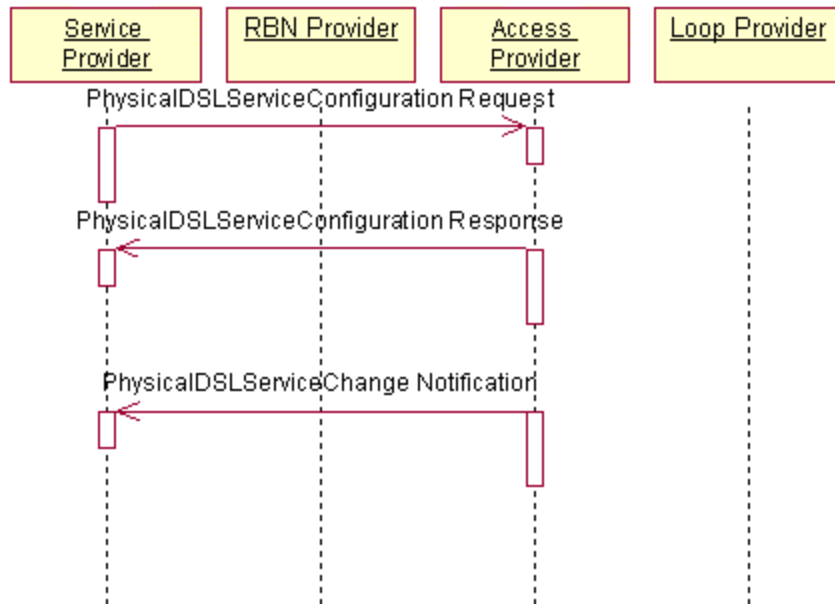
### Service Fulfillment: Service Configuration 4.1.10.3\_1 Customer Access Transport Service Configuration



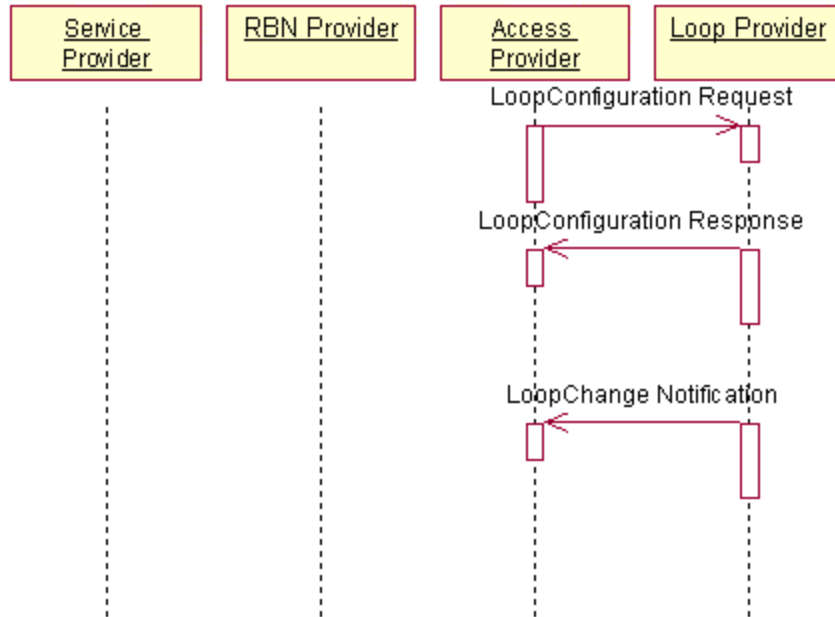
## Service Fulfillment: Service Configuration 4.1.10.4\_1 RBN Transport Service Configuration



## Service Fulfillment: Service Configuration 4.1.10.5\_1 Physical DSL Service Configuration



## Service Fulfillment: Service Configuration 4.1.10.6\_1 Loop Configuration



## Service Fulfillment: Service Configuration 4.1.10.7\_1 CPE Configuration

