Technical Report
TR-022

The Operation of
ADSL-based Networks

ABSTRACT:
This document describes the generic processes required for the operation of ADSL-based network in terms of Network Operational Reference Models (NORMs). It gives greater detail about the process components where this is required to understand how the capabilities of ADSL equipment, network management and testers may be used to plan and build the network, provision service, repair and maintain the network, and monitor network performance.

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1.   Scope

This document describes generic processes required for ADSL-based service operations in terms of Network Operational Reference Models (NORMs). It gives greater detail about the process components where this is required to understand how the capabilities of ADSL equipment, network management and testers may be used. In the process diagrams components that require functionality in equipment, network management, or testers are indicated by shading and a tick.

1.1   Definitions

Generally, services over an ADSL access-based broadband network will be provided and supported by a number of different operational organisations. These organisations may be part of one company or more than one company. Leaving commercial issues aside, it is necessary to have a clear idea of the roles of the different organisations and how the functionality of equipment, network management and test equipment can support their ability to discharge their roles for the benefit of the end customers.

There is much confusion over the use of the words service and network and so it is proposed that a common terminology is described for clarification.

For the purposes of this document a service is an application that runs over an end-to-end connection supported by ADSL access technology. Thus, for example, a Service Provider may provide Internet Access, VOD, or Telephony. A Service Provider does not provide ADSL access.

Access is the digital connection of a customer's terminal to DSLAM equipment at the local central office via an ADSL.

A regional network is a digital network that connects the DSLAM to a Service Provider's equipment.

A loop is a metallic pair of wires running from the customer's premises to the DSLAM.
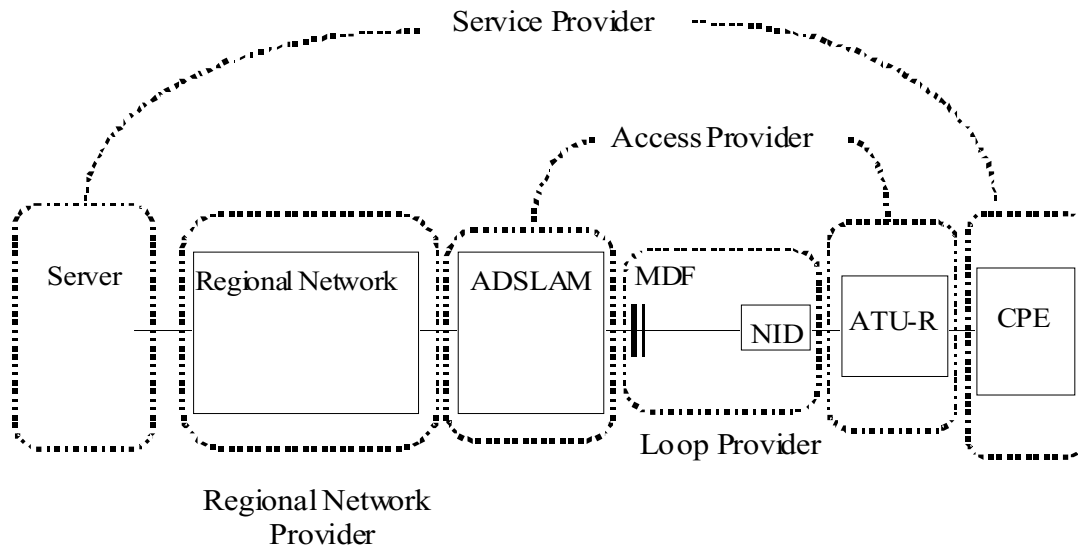
Fig. 1: Provider Architecture

Fig.1 shows the key components of an ADSL access-based broadband network. It indicates ownership of the components to different providing organisations. The role of these providers is as follows:

The Service Provider:
- provides service to the end customer,
- 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

The Regional Network Provider:
- provides appropriate connectivity between the access network and the server.
- is responsible for regional network performance and repair.

The Access Network Provider:
- provides digital connectivity to the customer
- is responsible for the performance and repair of the access transmission equipment.

The Loop Provider:
- provides a metallic loop from the access network equipment to the customerÕs premises
- is responsible for the integrity of the metallic loop and its repair.

An illustrative relationship between the providers is shown in Fig. 2. To provide a seamless and possibly automated operational environment interfaces between the providers need to be defined.

Fig. 2: Relationship Between Operators


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SN                Service Operator              SA

        Provides transmission         Provides access
        Restores transmission         Restores access

        Orders connection             Orders access connection
        Reports transmission problems Reports access problems
                              NA

Regional Network                        Access Operator
    Operator

        Provide loop
        Restores loop        Orders loop
                             Reports loop problems

                                                      AL

              Loop Operator
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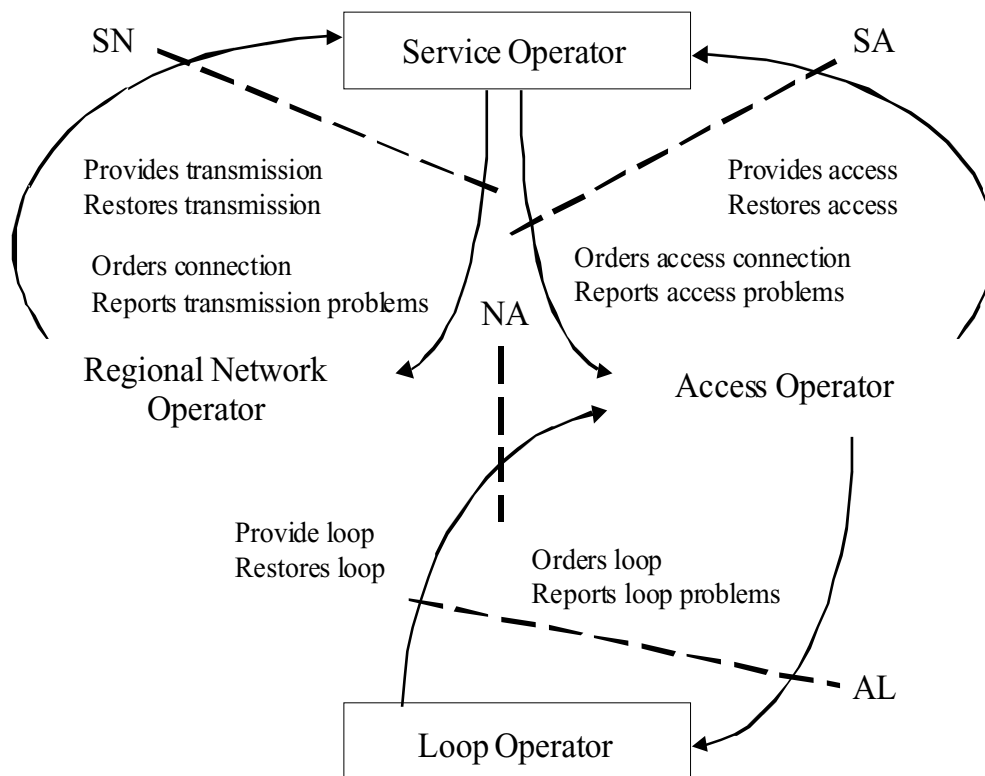
These are:

Service to Access Provider Interface   -   SA
Service to Regional Network Provider   -   SN
Regional Network to Access Provider   -   NA
Access to Loop Provider   -   AL

The definition of the flow of data across these interfaces will be an important enabler for operations and will be the subject of another ADSL Forum Document.

2.   Planning & Building

Planning determines where and when equipment is deployed that has a significant lead time, eg central office racks, element manager communications. It has as its input geographical distribution of the potential customer base, equipment cost and, if on-line confirmation of service availability from records is required for the provisioning process, copper pair transmission coverage identification.

Building is the process of installing and testing long lead time equipment so that it is ready to provide service when provisioning is complete. It will require ADSL multiplexers to have automatic self-testing capability, the element manager to build its database and possibly test equipment to verify potential service ready status.

Fig. 3 show the top level steps involved in planning and building the network. The network is first designed taking into account the capabilities of the equipment used and the distribution of potential customers for services. In this step pre-qualification of loops may be carried out to determine which customers can receive service. Test equipment may be needed for this.
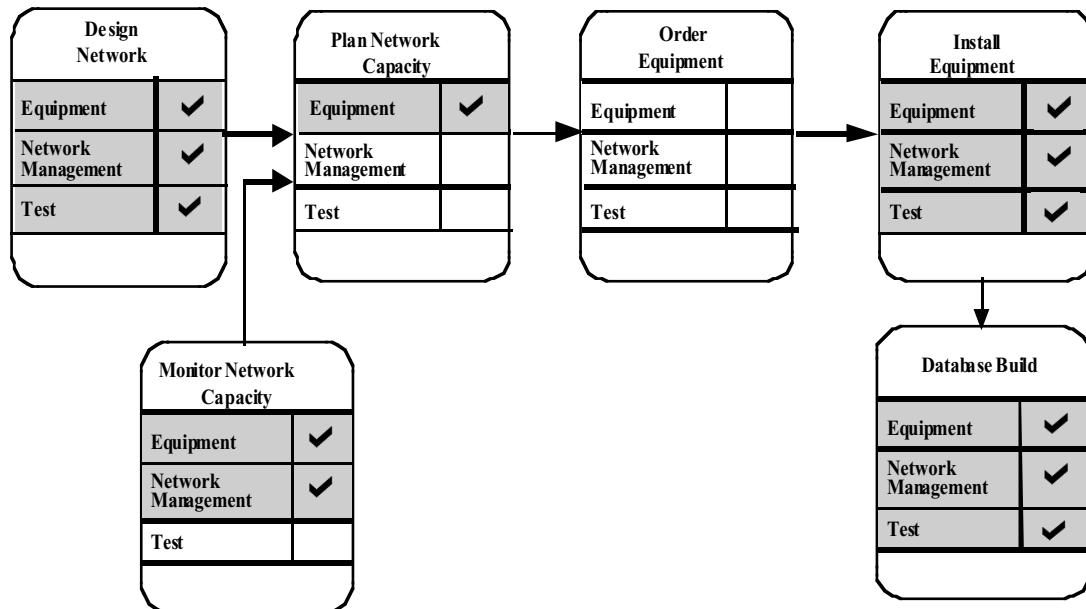
Fig. 3: Plan and Build NORM

Planning network capacity involves determining what quantities of equipment to pre-provide at various locations in the network to meet the initial demand and later to meet the growth. As a stimulus to capacity planning, monitoring network capacity is required to flag when spare capacity may be getting low. Ordering equipment involves either internal processes for getting equipment or commercial transactions with a supplier to provide more equipment. Installing equipment is the physical

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