The Backhaul Network (BN)

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Introduction

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The Backhaul Network (BN) is synonymous with the Inter-Exchange Network (IEN).

In Australia before about 1997 the standard term was Inter-Exchange Network, but with the persistent USA push of advertising publications, executive staff and equipment from the USA, the term Backhaul Network has become accepted as the equivalent of the ITU term of Inter-Exchange Network.

The Backhaul Network is a rather complex infrastructure because it is a hybrid of both switching equipment and transmission equipment, where each of these equipment technologies has a network management component that monitors, controls, measures and reports on the use and wellbeing of the switching equipment and the transmission equipment.
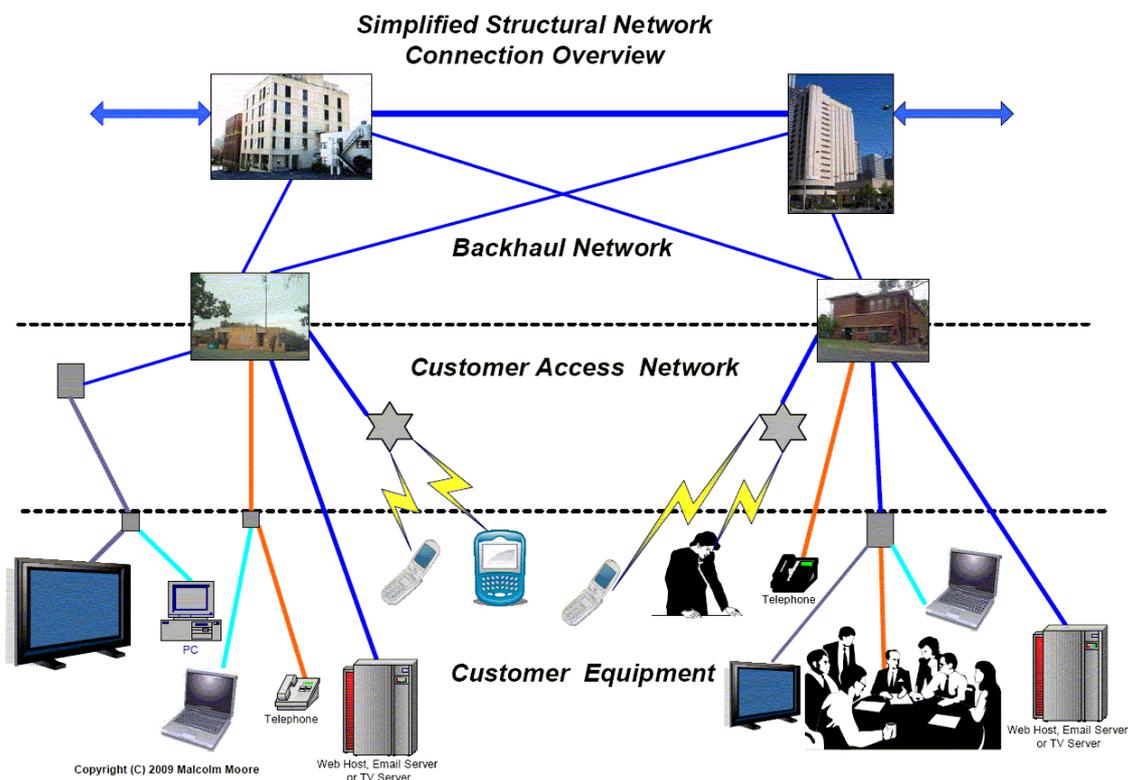
The above picture shows the network structures as three levels where the Backhaul Network is connecting between the various Exchange sites.

The blue lines are representative of optical fibre connectivity, the Grey lines are representative of coaxial cable and the Orange lines are representative of pair copper cable.

The stars in the Customer Access Network layer in the above picture are representative of Radio towers for radio / wireless connection to mobile personal devices like mobile phones and Radio Dongles for laptops.

The Backhaul Network does not have any Customers attached to it – because the Backhaul Network switches calls between pairs (or more) of Customer Access Network (CAN) infrastructures to create end-to-end continuity so that people and/or computers can communicate.

The Customer Access Network on the other hand, effectively is a non-switched structure that directly connects the Backhaul Network to the Customer Premises Equipment (CPE).

For telephony; in simplistic terms, there are a large number of automated switches that are located in virtually every city, town or suburb with more than about 1000 Customer Access Network connections. All these automated switches are connected by a mesh of transmission links / interface equipment at each end.

In situations where there are less than about 1000 CAN connections at a telecommunications facility, a remote integrated multiplexer acts as a geographical extension of the Backhaul Network's local switch and brings these CAN connections in as a multiple of 2 Mb/s streams on a transmission link.

For Broadband: in simplistic terms the Backhaul Network is a high occupancy, high throughput capacity switched network infrastructure that usually uses large switch/routers to switch connections between exchange sites, and the transmission paths between these exchange sites is usually constructed with Single mode Optical Fibre (SMOF).

Backhaul Network-CAN Interconnection Points

Historically, the theoretical demarcation point between the CAN and the Backhaul Network was at the Switchboard Operator's speech / feed bridge (where the customer signalling in the CAN and the Backhaul Network signalling in the Backhaul Network interface to each other).

With digital exchanges this theoretical demarcation point is in the hybrid (transformer) where the analogue CAN side bi-directional transmission is converted to two unidirectional paths (send, receive) and the analogue speech is changed into / from 64 kb/s digital streams.

As it is impractical to split the line interface card into two, and have interconnection points in the card; the practical decision is to use the next downstream connection point, which is the Equipment side of the Main Distribution Frame (MDF) as the practical demarcation point between the digital Backhaul Network and the analogue CAN.

More recently the Backhaul Network is now carrying almost all traffic using the Internet Protocol (IP) because this form of network transmission is highly fault tolerant and the connection is broken up into datagrams (or packets) that have their desired destination addresses included. This type of network transmission is ideal for data transmission, but very difficult for voice or video transmission.

The CAN-Backhaul Network interconnection point in this case is in the Universal Broadband Router (uBR), or Digital Services Line Access Multiplexer (DSLAM), or the Optical Line Termination (OLT); where one side of this equipment connects to the

Backhaul Edge Router, and the other side of this equipment connects to the CAN transmission medium (be it Fibre, Coax, Pair Cable, Radio etc.).

This topic and the Connectivity Model are covered in more detail in Telecommunications 101.