Reinventing the NETWORK
The only constant is change.

Today, the network is being access using a broad array of devices and a wealth of new media platforms to offer subscribers high-value services. This is causing service providers to re-examine how access is defined. ADTRAN is working with its customer base to deliver new, innovative solutions for every ingress point in the network. These innovations are enabling service providers to accelerate change; quickly launching next generation services and simplifying the execution of network transformation strategies.
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hiX 5600 SERIES

The hiX 5600 Series is a Future Proof Multiservice Access Platform Providing:

- Residential services with ADSL2+, VDSL2 Vectoring and FTTH
- Voice migration for ISDN and POTS VoIP services
- Business services with EFM bonded SHDSL, VDSL2 and fibre
- Mobile backhauling
The hiX 5600 Series is a family of high-performance multi-service access and aggregation nodes designed to ETSI standards. These nodes bridge the gap between the carrier IP network and the end subscriber for POTS, ISDN, VDSL, SHDSL, ADSL, Fast Ethernet, Gigabit Ethernet, IPTV and other broadband and business services. Systems are available, ranging from two service slots (up to 144 ports) to 14 service slots (up to 1,008 ports).

The hiX 5600 Series is built upon a pure IP core and supports both legacy and emerging service interfaces over both copper and fibre. This mix of services on one platform enables service providers to future proof their networks. New services can be deployed with the simple change of a line card, avoiding equipment obsolescence and protecting the service provider’s network investments.

All hiX-based systems provide voice and data services as well as a simple migration path from legacy interfaces to IP such as transitioning voice services from POTS or ISDN to VoIP. Broadband data access can be provided using SHDSL, ADSL or VDSL (with or without splitters) as well as high-density fibre using Fast Ethernet or Gigabit Ethernet. This unique mix of services from a single IP-based platform enables service providers to quickly adapt to new business opportunities and remain highly competitive.

The hiX 5600 Series platforms are available in four different sizes allowing for maximum flexibility. All four models (hiX 5622, hiX 5625, hiX 5630 and hiX 5635) can be deployed at the central office or deep in the network.

All chassis support multiple service slots for customer facing interfaces. Line cards include:
- ADSL2+ (72 ports/card), optional MELT
- VDSL2 (48 ports/card, independent 48 port vectoring or part of system level vectoring, optional MELT
- VDSL2 (72 ports/card, independent 72 port vectoring or part of system level vectoring, optional MELT
- SLV System Level Vectoring boards (for 192 or 384 port vectoring groups)
- SHDSL.bis (48 ports/card), optional MELT
- POTS (SIP and H.248 capable, 72 ports/card)
- ISDN (32 ports/card)
- Gigabit Ethernet (48 ports/card)

This is complemented by fully redundant 1 GbE or 10 GbE uplinks on a central switching unit (CXU) plus the redundant power supplies that make the hiX system truly carrier grade. An optional secondary CXU can be equipped as standby unit which uses the redundant dual star architecture on the backplane to each line card.

All systems are managed by ADTRAN’s Access Integrator Ethernet (ACI-E) Element Management System. The ACI-E EMS and hiX nodes communicate using SNMP via in-band or out-of-band channels. The ACI-E provides a Graphical User Interface (GUI) and northbound interfaces such as SNMP, WSPI (Web service-based XML provisioning I/F) for a smooth integration into service provider operational systems.
MANAGEMENT SOLUTION

ACI-E is the Future Proof Management System for hiX 5600 MSAN, hiX 1100 OSP DSLAM and the 500G Series G.fast Nodes.

The ACI-E ensures a highly efficient work flow from the Customer Relationship Management (CRM) through to the network element. Flexible scalability to service networks from regional to nationwide scale. The standardised northbound interfaces ensure simplified and accelerated OSS integration.

- Standardised Northbound Interfaces for provisioning, test, inventory retrieval and for alarm forwarding
- Geographically diverse redundant server deployment option for high reliability
- Future proof Persistent Management Agent (PMA)—concept (BBF WT-301) for G.fast nodes
- Graphical assistants guide through configuration steps
- Web browser client with intuitive User Interface aligned to operator’s work flow
- Windows OS and Linux OS support
- Hardware agnostic
The management integration is a key factor in reducing network OPEX. Featuring powerful standardised northbound interfaces, ACI-E can be integrated into any Operations Support System/ Business Support System environment.

ACI-E is a key component of ADTRAN’s advanced management solutions. It provides the management for the Carrier Network Broadband Access portfolio, i.e. Multi Service Access Node (MSAN), OutSide Plant DSLAM (OSP), GPON systems of the hiX Series and the 500G Series G.fast nodes.

The PMA will provide the future proof concept to manage large quantities of reverse powered G.fast nodes or Distribution Point Units (DPUs) in ACI-E. This industry defined innovation represents a paradigm shift in network management, providing an extensible, horizontally scalable solution, capable of efficiently operating millions of elements.

Carrier Benefits

- Standardised northbound interfaces based on Extensible Markup Language (XML) and Simple Network Management Protocol (SNMP) enable easy integration for interworking with the customer’s OSS/BSS solutions. Provisioning as well as test and inventory retrieval are supported via the ACI-E XML Web based Service Provisioning interface. Alarms are forwarded via the SNMP northbound interface.
- An advanced, intuitive WEB based Graphical User Interface (GUI) provides an accurate view of network operation and is complemented by graphical representation of the network elements, graphical assistants for specific functions, context sensitive navigation to related views, as well as context sensitive help.
- The PMA: According to the BBF WT-301—serves as central storage and orchestration agent for a large network of G.fast nodes and resides in the management cloud. All G.fast node configuration is applied through the PMA which stores this configuration persistently. The PMA ensures uninterrupted provisioning and storage of performance data of the G.fast nodes by the ACI-E and the OSS/BSS applications independently from the nodes power status.
- The PMA connects northbound through a Representational State Transfer (REST) interface to the ACI-E Element Manager. The horizontally scalable PMA facilitates the rapid startup thousands of nodes within minutes by pushing down the configuration southbound through a NETCONF interface to the G.fast nodes.
- High Availability for the PMA itself is achieved by a locally and geographically redundant installation of the PMA servers.
- Expedited service commissioning and accurate connection set up afforded by the simple graphical representation of interfaces and ports and the element chassis. Extensive use of profiles for configuration of xDSL and Voice services, including Virtual Local Area Network (VLAN) and Internet Group Management Protocol (IGMP) configuration.
- Advanced fault management capabilities provide real-time alarm indication and display, alarm logging and tracking, alarm forwarding to OSS and loop-back test execution enabling expedient fault detection, analysis and repair.
- Security is reinforced for both ACI-E and the network through login procedures and configurable user profiles which specify execution privileges and access rights to network resources.
- ACI-E’s advanced system architecture fulfills high-grade scalability and reliability requirements. A modular, system structure provides optimum, cost-effective adaptation to the customer network, beginning with a single-server configuration and extending horizontally to multiple servers, managing several tens of millions of ports with one integrated solution. Furthermore a geographical redundancy solution is available for improving reliability and availability.
- Service assurance makes use of ADTRAN’s extensive real-world knowledge and experience in outside plant architectures to provide comprehensive physical and logical layer diagnostics. Working up through the service or application layer (e.g. Single-Ended Line Testing (SELT), Dual-Ended Line Testing (DELT) and Metallic Line Testing (MELT)). Performance Monitoring (PM) is a non-service affecting tool that provides Operation, Administration and Maintenance (OAM) PM Statistics. These operational tools enable carriers to deploy ADTRAN solutions in large scale with confidence.
MULTI SERVICE ACCESS
Broadband and Triple-Play without FTTP Expense

Wireline carriers are faced with the difficult challenge of transforming their existing networks to provide next-generation services, enabling not only voice and simple broadband connections to the Internet, but newer services like many screen IPTV. The dynamics of these new services are constantly evolving making it difficult to identify the right network architecture. While fibre access technologies may provide the ultimate solution for addressing consumer access bandwidth especially in greenfield deployments, the fact remains that there is massive embedded base of copper access infrastructure. Technological advances including vectored VDSL2 and bonded ADSL2+ are enabling ultra-broadband speeds over copper. ADTRAN’s innovative Fibre to the Node (FTTN) broadband access systems dramatically lower the total cost of deployment in a FTTN architecture.

The hiX 5600 is ideally suited to support Gigabit Ethernet aggregation for FTTN architectures, from either central office or remote terminal locations. As carriers work to shorten copper loop lengths to deploy higher bandwidth services, innovative platforms like the ADTRAN hiX 5600 will enable that deep fibre push. The hiX 5600 integrated broadband access and Gigabit Ethernet aggregation capabilities provide carriers with a single platform that enables both service delivery and service aggregation, reducing both capital and operational expense.
RESIDENTIAL SERVICES
VDX Vectoring/FTTC

VDXL2 Data Rates are Limited by Crosstalk and Signal Attenuation.

The vectoring engine learns the crosstalk couplings in the cable and cancels the crosstalk actively at the transmitter—to achieve a virtual crosstalk-free copper loop. The hiX 5600 provides VDSL2 vectoring in terms of:

- Board Level Vectoring (BLV) with a single VDSL2 line card
- System Level Vectoring (SLV) from two and up to six line cards. This allows vectoring across line cards and increases the number of crosstalk canceled lines per vectored system

A VDSL2 subscriber can achieve up to 100 Mbit/s downstream traffic over a distance of 550m from the curb in a crosstalk free cable binder. The main impact to the VDSL2 performance is caused by noise when a transmitted signal leaks into the far end receivers connected in the same binder. This far end crosstalk causes a significant degradation of the VDSL2 performance. Vectoring is an active method to reduce the far end crosstalk by adding negative noise to the signal, so that in total, the noise is canceled out and the clean signal remains.

The hiX 5600 Board Level Vectoring performs a full cross talk cancelation over one or more cable binders terminated at a single VDSL2 vectoring board interface unit. In case of Board Level Vectoring the vectoring processing is done on the line card. All the necessary measurement and calculation algorithms are implemented on the same interface unit, negating the need for investment in system level vectoring resource cards until subscriber growth mandates the deployment of successive line cards.

Frequently binders from a trunk cable will terminate on different VDSL48 line cards. Pairs in the same binder need to be handled as a single vectoring group to effectively eliminate far end crosstalk. ADTRAN’s System Level Vectoring Controller coordinates the initialise of all the VDSL links within the vectoring group which provides a stable crosstalk canceled system in larger binders.

Legacy Modems connected to a vectored system can cause crosstalk which impairs the vectoring performance. In order to minimise the performance reduction the hiX 5600s Universal Vectoring supports a fallback scheme for non-vectoring enabled CPEs. Non vectoring capable VDSL2 CPE will be adjusted to a limited frequency spectrum.
RESIDENTIAL SERVICES (continued)

VDSL OSP Solution

Accelerated Deployment Model, Facilitating Rapid Service Introduction, Reducing Subscriber Loss to Cable Churn, While Reducing Time to Increased Revenues.

Deliver ultra-broadband services using field proven outside plant technology with highly flexible mounting options. Access premium service revenues while reusing the existing copper assets. Design refined and optimised over 12 years, exploiting ADTRAN’s unique experience deploying outside plant (OSP) DSLAM solutions.

- Fully sealed enclosure (IP68) available for go-anywhere deployment flexibility
- Cost optimised IP54 enclosure for indoor deployments
- Passive cooling for maintenance free silent operation in residential deployments
- 48 ports of vectored VDSL2 per OSP
- Support of vectoring, vector-friendly and non-vectoring CPEs
- Cross System Level Vectoring (XSLV) with up to 96 port vectoring group
- VDSL2 EFM bonding for greater bandwidth and reach
- Onboard Metallic Line Testing (MELT)
- Multi-port GigE or GPON ONT SFP uplink
- Carrier grade feature set
- Managed by Element Management System ACI-E
Technological advances, including VDSL2, bonded VDSL2 and vectored VDSL2 enable the ultra-broadband speeds over copper. ADTRAN provides here an ideal solution for the needed new locations with flexible deployment options using one uniform device for all types of locations.

This ADTRAN 1148V Optical Network Unit utilises Vectored VDSL2 to allow service providers to realise ultra-broadband speeds over their existing copper infrastructure, economically delivering broadband connections to the home and enabling advanced communications and entertainment services.

Fed with GigE or integrated GPON SFP, the 1148V ONU supports up to 48 subscribers with high-speed vectored VDSL2 data, ideal for Fibre to the Curb (FTTC), Fibre To The Distribution Point (FTTdp), and other applications where advanced services are required for a small number of subscribers.

Services can be deployed rapidly over existing in-building wiring and with minimal installation and construction costs. Combining the ability to be deployed in any environment with dramatically lower deployment costs, the 1148V ONU allows carriers to cost-effectively reduce loop lengths and maximise the performance of VDSL2 for every subscriber in their copper network.

Two 1148V units can be deployed together, giving a network entity with the capability of providing up to 96 lines of vectored VDSL2. This architecture utilises cross system level vectoring between the two co-located units, and so the network element appears as a single managed entity in the network. Cross system level vectoring is an optional feature.

The 1148V ONU is ideally suited for deploying new FTTC networks and upgrading existing networks. Its fully sealed housing makes the 1148V ONU a robust and reliable network element that can be deployed in pedestals, poles, low-profile “doghouse” enclosures, and even underground vaults and hand-holes. Service providers can leverage their existing fibre infrastructure while updating the electronics to provide state-of-the-art 100 Mbps+ vectored VDSL2 services to retain existing customers and win back those lost to competing technologies.
RESIDENTIAL SERVICES (continued)

G.fast/FTTdp Solution

Vectored G.fast and VDSL2 Product Series Realising Gigabit Speeds Over Existing Copper Infrastructure.

- G.fast and VDSL2 dual mode
- ADTRAN full sealed DSLAM design for go-anywhere deployment
- AC/DC, remote powering (RFT-V) and reverse powering options
- Flexible port count options from 4-, 8- and 12-port
- Bypass relay function for zero touch service migration
- “Zero Touch” and “Self-install” support
- GigE or GPON ONT SFP uplink
- PMA for large-scale, high-volume deployments

SOLUTION

The ADTRAN 500G G.fast Series is an innovative approach to combine vectored G.fast and VDSL2 product capabilities with commercial G.fast chip sets to allow service providers to realise Gigabit speeds over their existing copper infrastructure. Based on the TDD scheme of G.fast a full configurable ratio between 10:1 and 1:1 of the downstream to upstream of user data rates is supported.

G.fast as a real 1 Gbps technology bridges the gap between VDSL2 vectoring and FTTH and therefore can also be seen as enabler for FTTH. G.fast can solve some of the deployment issues with FTTH, addressing various deployment challenges by using the existing copper infrastructure in the final meters of the access link.

As G.fast is foreseen to operate in the range up to 250 m from customer, very short loop lengths provides data rates up to 1 Gbps. The shorter loop length leads to a high number of nodes with reduced quantities of addressable subscribers per DPU. This requires new economics with cost effective solutions for DPU and new installations concepts like “Zero touch” and “Self-install” which are fully supported by ADTRAN’s 500G Series.
Two major deployment scenarios must be taken under consideration:

**Fibre to the Building (FTTB)** requiring less space and low weight, facilitating single engineer installation. Designed for low heat dissipation providing silent, maintenance free, passive cooling. This is similar to the concept of **Fibre to the Distribution Point (FTTDP)** which requires in addition sealed enclosure with IP68 and different powering variants with local AC and DC interface, remote power feeding and reverse power systems.

Its fully sealed housing makes the 512G ONU a robust and reliable network element that can be deployed in pedestals, poles, low-profile “doghouse” enclosures, and even underground vaults and hand-holes.

Based on ADTRAN’s 12 years of real world deployment experience and 3 million deployed ports in 100,000 OSP DSLAM, the 500G Series is the low risk option, with a proven heritage for long-term stability.

**PMA—the new future proof management concept for 500G Series**

ADTRAN introduces with the G.fast product family the Persistent Management Agent (PMA) concept according to the BBF WT-301 for DPU management. This future proof management concept supports zero touch installation and easy management of millions of DPUs in the field.

The Persistent Management Agent acts as a proxy for the DPU in the management cloud and performs all management operations on behalf of a given DPU whether or not that DPU is actually powered. Therefore it holds all persistent configuration data and pushes this towards the DPU when it is available.

The PMA concept also addresses the challenge which comes with reverse powering, where the whole node can shut down if the last subscriber switches off their modem and associated reverse power source in their home. Most traditional Network Management Systems would treat such a spontaneous loss of power as a fault condition and raise an alarm, which would cause a high volume of unwarranted management traffic and disturbance.

The PMA application will run in redundant mode supporting geographic redundancy. One PMA application is able to handle up to 150,000 DPUs and is horizontally scalable to provide management capabilities exceeding 1 Million DPUs. It supports high performance startup to facilitate the orderly bring up of thousands of nodes within a minute in case of a regional power outage.
BUSINESS SERVICES
Carrier Ethernet Solutions—CE 2.0


- Access premium business revenues independent of the existing physical infrastructure
- Carrier Grade MEF certified to CE 2.0 for demanding business services
- High-speed and symmetrical services over SHDSL, VDSL2 and fibre access links
- Increase service availability and reach with bonded copper access
- Deliver carrier-grade Layer 2 and Layer 3 services within a single converged appliance
- Centralised appliance management and automated provisioning

Ethernet over Copper (EoCu) and TDM (EoTDM) utilise improved data transmission standards to offer a similar value proposition as fibre. These advanced standards include ITU-T G.998.2 and IEEE 802.3ah, known as Ethernet in the First Mile (EFM), which defines a universal way to effectively bond lower bandwidth TDM circuits or dry copper loops (pairs of wires), creating a higher-speed Carrier Ethernet access connection. ADTRAN Carrier Ethernet solutions fully leverage these standards as well as other unique carrier-class innovations to allow service providers to deliver better services to more customers—sooner.

The solution allows service providers to extend Gigabit Metro LAN and Ethernet Private Line services to enterprises that previously could only avail of basic, lower rate Business DSL and VoIP service. ADTRAN products deliver rates eight times higher than typical EFM services and four times more than Business DSL. Enterprises of all verticals may benefit from Gigabit Ethernet service levels to accelerate next generation applications and services, regardless of their proximity to direct fibre access.

ADTRAN products support the CE2.0 service types of E-Line, E-LAN and E-Tree as well as E-Access services of the Metro Ethernet Forum (MEF). This allows a range of applications such as LAN extension or Layer 2 Virtual Private Networks (VPN) for business customers that are more easily and cost-effectively set-up than other network solutions. The CE2.0 standards enable a rich set of features for enterprise and cloud application service assurance.
NetVanta 832T Cost effective network termination, allowing bonding for up to two e.SHDSL pairs respectively. AC local powered.

NetVanta 834T Cost effective network termination, allowing bonding of up to four e.SHDSL pairs respectively. AC local powered.

NetVanta 868 Network termination element for several 100 Mbps service delivery using innovative EFM VDSL2 bonding with built in vectoring support, for up to eight access pairs. The appliance is AC local powered, and provides both electrical and optical Ethernet interfaces for enterprise user network side.

NetVanta 4660 Integrated MEF CE2.0 Layer 2 and Layer 3 Carrier Ethernet Services Router, delivering three types of WAN interfaces: quad/octal bonded SHDSL or dual/quad bonded VDSL2 via plugin modules or optical gigabit interface. In addition, the NetVanta 4660 offers four gigabit combo interfaces (copper or small form factor SFP) for enterprise user network side. It combines MEF CE2.0 Layer 2 Carrier Ethernet functionality with the L3 IP routing functionality in one device. Thanks to its integrated optical WAN interface it provides native support for direct fibre connection, while benefitting from bonded SHDSL or VDSL for primary or backup copper access.

NetVanta 8044M Carrier Ethernet Network Termination delivering up to four optical and four electrical Gigabit Ethernet Interfaces. The interfaces can be either configured as NNI or UNI interface. The NetVanta 8044M brings together the value of several ADTRAN Carrier Ethernet Layer 2 solutions: Ethernet over Fibre NTE, Ethernet ring (ERPS) and pseudowire solutions. Expansion options include E1 circuit emulation service expansion.
MIGRATION OF VOICE SERVICES
Migration of Voice Network

MSAN Offers a Field-proven Migration Path for Operators from Legacy Circuit Switched Voice Services to an All-IP Next-generation Network.

ADTRAN's implementation supports different scenarios of MSAN connections towards control and media servers using the standard Session Initiated Protocol (SIP) and the protocol H.248 (also called Megaco).
ADTRAN helps operators solving one of the most challenging decisions to upgrade from Time Division Multiplexing (TDM)-based voice switches to optimised Internet Protocol (IP) networking equipment. Phasing out the Public Switched Telephone Network (PSTN) does not mean phasing out Plain Old Telephone Service (POTS) for those users who want to retain their current service. Operators can continue to support their customers on an IP network. ADTRAN offers ways to cost-effectively evolve the network.

The ADTRAN hiX 5600 Series is a family of high-performance, carrier-class IP multi-service access and aggregation nodes that comply with the ETSI standards and supports best any IP network migration. These nodes bridge the gap between the carrier’s IP network and the customer premises over both fibre and copper lines. One of the key differentiators of the ADTRAN hiX 5600 Multi-Service Access Node (MSAN) is the advanced support of voice services.

The substantial legacy customer base is a vital source for on-going revenue. Revenue is increased by offering additional multiplay services, such as Ultra Broadband, IPTV, e-health, ... and the customer base is increased. In addition, the MSANs require less floor space, have lower requirements in air-conditioning, power consumption and also lower maintenance efforts compared to the TDM-based systems which lead to lower overall operational expenditure (OPEX).

ADTRAN has industry-leading experience in PSTN migration projects—end-to-end and turnkey. The main function of the Voice over IP (VoIP) feature within ADTRAN’s MSAN hiX 5600 family is to enable the MSAN to do the mediation between legacy POTS/Integrated Services for Digital Network (ISDN) and emerging next generation IP packet services by converting voice streams originating from the subscriber to media streams for IP networks and vice versa.

A full set of Integrated Line Test Functions (ILTF) ensures a high availability of the analog telephone service. Our programmable interface subsidises long loop length. Up to 16 independent VoIP Gateways (VGW) per system support wholesale application. Using only one IP and MAC address for the whole MSAN saves providers IP address resources.

In case of losing the communication to the voice control function, basic local and emergency calls in stand-alone mode are supported.

Statistics counters for Performance Monitoring (PM) ensures all the time best supervision of voice service quality. In general, all transparent supplementary services are available. These include carrier selection and carrier pre-selection, which are being provided from the network side. In addition all kinds of supplementary services (like CONF, CLIP, CLIR, CFU, CCBS, CT, CH and many more) are supported.

The ACI-E Element Manager System (EMS) fully supports the MSAN voice services from small to huge networks by high scalable solution. Designed for full integration into customers OSS, including remote provisioning and testing as well as alarming.
Tunneling of Traditional Enterprise E1 Service Connections via IP/Ethernet.

ADTRAN’s NetVanta 8044M MEF certified CE 2.0 network device offers operators the opportunity to deliver up to 16 E1 services.

The eight-port circuit emulation expansion module allows service providers and enterprise customers to leverage ADTRAN’s experience in developing and deploying pseudo wire networks. This can be used in providing a transition path for E1 legacy services to all-IP services migration.

The core Ethernet access features of the NetVanta 8044M, include a powerful Ethernet processor, four flexible SFP interfaces and four 10/100/1000 Mbps electrical interfaces. Flexible bandwidth management; Ethernet flow mapping, prioritisation and tagging; as well as the versatile management options make ADTRAN’s NetVanta 8044M an excellent choice as an Ethernet services termination device.

With the integration of Ethernet over Fibre (EoF) into the hiX 5600, ADTRAN offers a scalable solution that supports service migration as providers continue to examine the customer demand for greater bandwidth enabling long-haul reach to residential and business networks.

The NetVanta 8044M also will allow an operator to recover network clocking at the customer site using only packet transport via a variety of methods. ADTRAN employs both clock and adaptive timing distribution over packet methods.
PBX Connectivity for Enterprises

Connecting Traditional Enterprise PRI Services to IP/Ethernet Networks.

Offer premium Primary Rate Interface (PRI) connectivity independent of the existing physical infrastructure.

SOLUTION

For PBX customers, who are not ready to evolve their equipment to IP, ADTRAN provides service providers a simple cost efficient solution to continue to support PBX access over TDM facilities. In this scenario, the PRI trunk will terminate on a centralised gateway deployed at a location, with minimal impact to the customer.

The NetVanta 6310, 6360 and 644 combines the capabilities of an Ethernet access device with an IP Business Gateway. When used in conjunction with ADTRAN’s hiX 5600 platform, centralised next generation service can be delivered to small and medium businesses. The NetVanta devices provide SIP trunking to legacy PRI translation extending the life of existing telephony equipment.

The solution combines converged services delivery with an IP Business Gateway (VoIP services) and Ethernet access device in one chassis (SIP gateway, IP router and network security).

Managed by user-friendly Web-based GUI and secured by IPSec Virtual Private Network (VPN) for secure corporate connectivity across the Internet the ADTRAN NetVanta devices are the ideal choice for business customers.
MOBILE BACKHAULING

Ethernet Gateways and Service Routers Meet the Extended Needs of Mobile Networks.

- SLA management support
- Stringent quality of service controls
- Scalable solution with low operational cost

NetVanta 8044M

NetVanta 4660

NetVanta 8044M

NetVanta 8044M

Central Office

hiX 5600 Series

IP Core

GigE

GigE

N x 10 GigE

N x GigE

Enterprise Business

ET and Ethernet

2G/3G/4G Cell Sites

NetVanta 4660

NetVanta 8044M

NetVanta 8044M

NetVanta 8044M

NetVanta 8044M
Providing a scalable, lower cost operational model while meeting the stringent quality of service, SLA management and clock synchronisation requirements demanded by mobile network operators.

Small Cell Expansion of 4G/LTE
The relentless demand for cloud and for premium video services is putting a tremendous strain on network access infrastructures as Wireless Service Providers (WSPs) look to support the resulting backhaul traffic. In order to preserve scarce spectrum resources WSPs are deploying tens of thousands of small or metro cells. For these unique deployments unlike larger macro cells, copper can be leveraged in place of expensive point-to-point fibre backhaul. VDSL2 delivers low-cost, native Ethernet to these small cells that will accelerate 4G coverage and increase typical service speeds.

Legacy to Next-Generation Migration
Service providers, focused on the delivery of new revenue, are introducing new network capabilities and applications. As network operators invest in new Ethernet networks to support this growth, they must continue to support traditional access services used by established mobile networks such as traditional GSM- or UMTS-based mobile services. These legacy technologies typically enable comprehensive coverage for the operator’s customer base and a vital source of ongoing revenue. The recommended mobile backhaul solution offers next-generation Carrier Ethernet services and allows for the migration of incumbent SONET/SDH services and transport architectures. Also supported is migration to evolving network synchronisation services based on ITU-T G.8262 Synchronous Ethernet.

SLA Assurance
The ADTRAN NetVanta 8044M is a modular Ethernet Access Gateway and the NetVanta 4660 is a modular Layer 2/3 Ethernet Services Router. Both were specifically designed to target the mobile backhaul market. Due to the strict performance requirements of mobile networks, backhaul solutions are often required to provide separate and secure customer viewable performance monitoring Web portals for each mobile network operator. A standards-based performance management tool set based on ITU-T Y.1731 and Y.1564 is used to capture delay, delay variation and loss metrics that are then presented on these performance management dashboards. ADTRAN solutions support these measurement techniques and do so with the accuracy needed to properly verify compliance to stringent backhaul SLAs.

Scalable Reliability
In the past, parallel networks were constructed to ensure each new service did not impact the quality of another—a method that is not only expensive to build and manage, but limits scalability. Now, service providers can eliminate the need for capital intensive overlay networks to support 4G backhaul services and grow their overall addressable market opportunity in both mobile and residential backhaul applications through scalable service separation. This approach delivers scalable reliability by extending MEF-certified, separated Ethernet services to provide important service isolation—key for serving individual mobile network operators that may share a single cell site or simultaneously offer residential broadband or business Ethernet with wholesale backhaul services.
CABINET SOLUTION

ADTRAN’s Long-term Experience in the Design and Maintenance of Cabinet Solutions has Resulted in a Highly Efficient System for Climate Control, Power Availability and Low Noise Emission.

- Overall controlled climatic environment
- Double wall lining to reduce solar loading and avoid condensation
- Vandalism protected
- Acoustically tuned low noise design
- Reduced Total Cost of Ownership (e.g. minimised power draw, …)
- Delivered pre-configured and tested for fast and easy installation
- Fully integrated into ADTRAN’s element system ACI-E
Conversion to Cabinets
Cabinet deployments throughout the existing copper network are becoming more popular than ever before. The reason is because state-of-the-art communication technologies like VDSL2 vectoring operate best over relatively short copper pair loops (less than 550 meter) instead of traditional loop lengths with 6,000 meters.

One way to reduce the length of the copper loops within an existing wire center is to divide the copper network into smaller clusters and place the active electronics in cabinets that are close to the subscribers. With the right mix of cabinets, electronics, and loop plant, service providers can enable ubiquitous Ultra Broadband services that deliver tomorrow’s technology today.

The Right Blend of Cabinet Design and Broadband Solutions
ADTRAN cabinet solutions range from small wall or pole mounted solutions, right up to our highly scalable modular cabinet solutions. All of these are designed around the hiX 5600 platform and allow service providers to quickly and cost effectively deploy xDSL deeper into their networks. All the cabinets are fully assembled, pre-configured and tested, reducing deployment times and accelerating the time to new revenues.

Compliance with Standards
All ADTRAN enclosures comply with relevant standards for outdoor equipment. Full compliance with industry standards is a hallmark of ADTRAN product design, and cabinet configurations are no exception. The need of Service providers to ensure long-term reliability and complete protection of outside plant communications equipment will be fulfilled. Rigorous thermal testing provides optimised equipment positioning to ensure that all products continue service delivery, even in the most challenging environments.

Broadband Services—Copper or Fibre
ADTRAN cabinets provide adequate room for both fibre and copper terminations, fully supporting simplified migration from FTTN to FTTH service architectures. Initially configured for xDSL copper-based services, cabinets are prepared for Fibre-to-the-Home (FTTH) deployments.

Shelter Solution (Pre-configuration)
The complete solution provided by ADTRAN is compliant with relevant standards (product safety, EMC, environmental conditions, surge and overvoltage protection, etc.).

Service and Management
On request ADTRAN can do also service for all used shelter components during On request, ADTRAN can also provide routine maintenance services for all used shelter components during operation. Together with monitoring of the most important functions of the shelter (power, air conditioning, access, DSLAMs, etc.) by the Element Manager (ACI-E), our solution is proven at reducing the operating costs and the potential downtime due to service interruption.
ADTRAN University is a comprehensive institute that provides training opportunities for ADTRAN products, ADTRAN certifications and technologies. All technologies and products elaborated in this brochure are included in the ADTRAN University. Training resources include Online Trainings as (self-paced), virtual trainings and Classroom Trainings in ADTRAN facilities.

Learn more about the value add of ADTRAN University Training, visit our web site at:

www.adtran.com/web/page/portal/Adtran/wp_training_landing

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