

The ATM Services Card from Alcatel provides ATM service adaptation and inverse multiplexing over ATM (IMA) for 3600 MainStreet Bandwidth Managers. Installed in any universal card slot (UCS), the ATM Services Card adapts low speed, legacy services to ATM cells for transmission through a multiservice broadband network.

The 3600 system is the world's best-selling T1/E1 bandwidth manager for managed voice and data services. The 3600 system provides integral support for:

- ▼ analog, digital and ISDN BRI/PRI voice
- ▼ $n * 56/64$ kb/s leased lines
- ▼ subrate data (DDS, X.50)
- ▼ packets (HDLC, X.25)
- ▼ frame relay



ATM service support for
the 3600 MainStreet
Bandwidth Manager



With the ATM Services Card, a simple node upgrade provides a cost-effective integration strategy to extend proven, mission-critical legacy services into the broadband world. Network consolidation reduces costs and complexity, and improves operational efficiency. Service users continue to receive the same high quality of service as set out in their service level agreements (SLAs), while service providers benefit from a significant increase in network efficiency.

Extending broadband benefits to legacy services

The ATM Services Card allows corporate networks to exploit tariff differentials that favor ATM. The card is also a tremendous benefit where WAN connectivity requirements exceed T1/E1 capacity, but are not high enough to make DS3/E3 lines an economical choice. The ATM Services Card is optimized to support a single ATM aggregate comprised of one to four inverse multiplexed T1/E1 links.

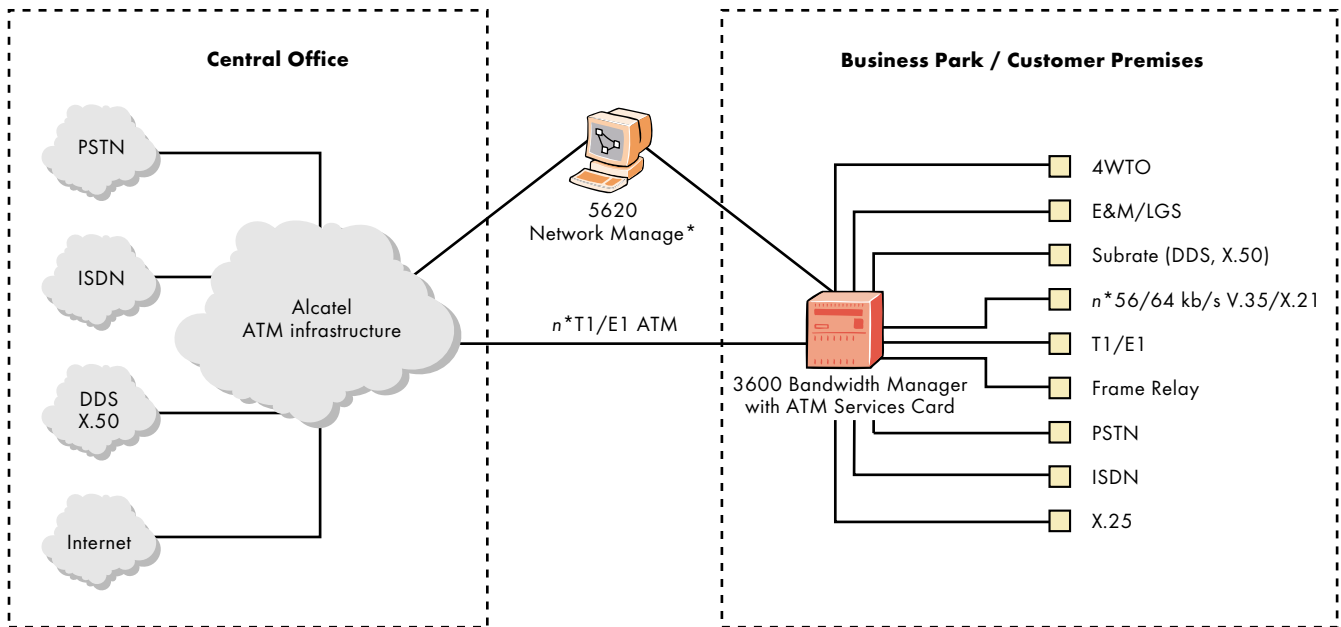
Installing the ATM Services Card in 3600 Bandwidth Managers increases network efficiencies, as operators manage only one logical “pipe” ranging from 1.5 to 8 Mb/s, instead of parallel, discrete T1/E1 links. Consolidation onto a single pipe also reduces the potential for the bandwidth fragmentation inherent in multiple T1/E1 links.

Two variants of the ATM Services Card are available. The first variant, the ATM Services Card AAL1, provides AAL1, cell multiplexing and $n \times T1/E1$ aggregates, where $n = 1, 2, 3$ or 4 . Network access is provided via the $n \times T1/E1$ physical links, which are inverse multiplexed according to the ATM Forum’s IMA specification.

A second variant of the ATM Services Card, the ATM Services Card AAL1/5, provides both AAL1 and AAL5 Service Adaptation.

By using the 3600 Bandwidth Manager to adapt established and proven narrowband services to broadband as close to the customer location as possible, service providers are able to increase access to their ATM core infrastructures. The $n \times T1/E1$ aggregate accommodates an infinite mixture of traffic types, and the ATM quality of service parameters ensure each traffic type is given and achieves the required service level.

▼ Extending broadband benefits to the 3600 Bandwidth Manager



* Alcatel 5620 Network Manager (NM), formerly the 46020 Network Manager. This product belonged to the Newbridge family. Newbridge was acquired by Alcatel in May 2000.

Technical Summary

ATM Service Adaptation

- ▼ AAL1 and AAL5 ATM Service Adaptation is performed by the ATM Services Card. For channelized user-side interfaces, e.g. T1/E1, service adaptation is selectable on a DSO basis

AAL1 ATM standard

- ▼ Performed by the ATM Services Card AAL1 or AAL1/5
- ▼ AAL1 DSO circuit emulation service (CES) for up to 84 DSOs for T1 and 104 DSOs for E1 interfaces (a 4 Mb/s variant of the AAL1 ATM Services Card offers a maximum of 60 DSOs for T1 and E1), in accordance with the ATM Forum standard AF-SAA-0032.000
- ▼ 4 Mb/s variant of AAL1 DSO CES with signaling multiframe 24 supports up to 48 circuits; with signaling multiframe 16 the card supports up to 60 circuits
- ▼ Multiple DSO CESs can be transmitted over the same virtual circuit (VC), e.g. LGS and V.35 DSOs with a common destination can be transmitted together
- ▼ Voice signaling, with robbed bit signaling (RBS) and channel associated signaling (CAS)
- ▼ Received cell delay variation tolerance user defined per VC; for signaling multiframe 24, the delay is configurable from 0 to 24 ms, and from 0 to 32 ms for signaling multiframe 16
- ▼ Transmit cell level user defined per VC from n to 47 in one byte increments, where n is the number of DSOs in the VC

AAL5 ATM standard

- ▼ Performed by ATM Services Card AAL1/5
- ▼ AAL5 provides:
 - FRF.5 network and FRF.8 service interworking
 - ATM Services Card AAL1/5 supports 4 Mb/s of user-side frame relay traffic

ATM cell multiplexing

- ▼ ATM PVC interface (ATM Forum UNI 3.1)
- ▼ Connection admission control based on peak cell rate, sustainable cell rate and minimum cell rate

Interfaces

Aggregate interfaces

- ▼ Single logical ATM interface, user programmable for up to four T1 or E1 interfaces
- ▼ Supports ATM Forum IMA standard
- ▼ T1 interface user programmable for DS1 or DSX-1 operation
- ▼ E1 interface with integral network termination unit (NTU), compliant with G.703, 75 ohm or 120 ohm
- ▼ Transmit timing obtained from node system clock or network

User-side interfaces

The 3600 MainStreet already supports Ethernet, frame relay, X.25, HDLC, leased lines, PSTN and ISDN services. With the ATM Services Card, these services are adapted to allow for transmission across an ATM backbone. Each service is provisioned and adapted to ATM as follows.

Ethernet

- ▼ Provides 10Base-T Ethernet connectivity, using 2720 MainStreet Internet Termination Units and 2721 MainStreet Router Termination Units
- ▼ Remote termination units provide a 128 kb/s frame relay output that terminates at the 3600 Bandwidth Manager on a six-port 2B1Q Line Card
- ▼ Frame relay interworking with ATM, compliant with FRF.5 and FRF.8 using AAL5 and nrt-VBR or UBR

Frame relay

- ▼ Provides frame relay PVC service, compliant with FRF.1.1 (UNI) and FRF.2.1 (NNI), and SVC service, compliant with FRF.4
- ▼ Frame relay interworking with ATM, compliant with FRF.5 and FRF.8 using AAL5 and nrt-VBR or UBR
- ▼ User interface speeds from 56/64 kb/s to 2 Mb/s[†]; total frame relay traffic supported up to 4 Mb/s
- ▼ Supports physical interfaces, including TIA/EIA-232 / V.24, V.35 and X.21 / TIA/EIA-499, direct connect and remote data termination units, and channelized T1/E1 interfaces

X.25

- ▼ Supports a full X.25 PVC and SVC implementation, for speeds from subrate to 2 Mb/s[†]
- ▼ Provides gateway support to other networks via X.25/X.75
- ▼ Frame relay and X.25 service interworking function on the PE card to provide an X.25 to frame relay to ATM integration strategy that can be phased in as required
- ▼ The ATM Services Card AAL1/5 provides transparent trunking over ATM using AAL5

HDLC

- ▼ Supports HDLC circuits with speeds from subrate to 2 Mb/s[†]
- ▼ ATM Services Card AAL1 provides basic service, including CES
- ▼ ATM Services Card AAL1/5 provides a transparent HDLC mode in which the circuit is encapsulated in ATM, compliant with FRF.5 using AAL5 and nrt-VBR or UBR
- ▼ Frame Relay Switch Card also supports a subrate interface module (SRIM) for subrate HDLC circuits (rate adapted) using HCM, DDS and X.50 formats

[†] For the 4 Mb/s variant of the card, the maximum super-rate bandwidth is 1,920 kb/s.

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Leased lines

- ▼ Supports leased lines over ATM using CES
- ▼ Supports structured (channelized) T1/E1/PRI, fractional T1/E1, n*56/64 kb/s, BRI, subrate (OCU-DP, V.35, X.21, TIA/EIA-232 / V.24) and voice frequency interfaces
- ▼ Analog voice (LGS, LGE, E&M) and digital voice (T1/E1) interfaces support RBS and CAS
- ▼ Supports private line automatic ringdown signaling and voice bridging for brokerage applications
- ▼ For ISDN S/T BRI and PRI interfaces, the D channel can use CES or transparent HDLC mode
- ▼ Voice and fax circuits can be transported as PCM, compressed using LD-CELP, A-CELP or stHCV or demodulated at up to 14.4 kb/s
- ▼ DSP application cards support DDS, X.50 Div. 2 and 3, 1.430 and HCM subrate multiplexing (DSOB), subrate switching and multidrop bridging functionality

PSTN

- ▼ PSTN interfaces (LGS, channelized T1/E1), with RBS or CAS, provide integrated access to PSTN services using a broadband infrastructure
- ▼ Circuits are supported over ATM using CES

ISDN

- ▼ ISDN interfaces (S/T BRI, U BRI, 23B+D and 30B+D) provide integrated access to ISDN services using a broadband infrastructure
- ▼ Circuits are supported over ATM using CES (B and D channels), or nrt-VBR or UBR (D channels)

Application Cards

- ▼ 10 circuit LD-CELP card with 14.4 kb/s G3 fax
- ▼ 10 circuit A-CELP card with 4, 8 and 9.6 kb/s G3 fax using 8 and 9.6 kb/s transport bandwidth respectively
- ▼ 20 circuit stHCV with 9.6 kb/s G3 fax card
- ▼ Generic DSP cards for subrate multiplexing, multidrop data bridging and echo cancellation



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