

3600 MAINSTREET FAMILY

BANDWIDTH MANAGERS | REL. 2.0

The Alcatel 3600 MainStreet family of bandwidth managers provides a flexible and scalable service delivery platform for the provision of a wide range of advanced business services. With its extensive range of interfaces and resource applications, the 3600 family is designed to meet the communication requirements of corporate enterprise networks and public telephone operators throughout the world.

A suite of protection capabilities especially targeted at the needs of service providers ensures that Alcatel nodes provide high levels of availability, reliability and accessibility. Alcatel advanced voice compression capability offers users significant cost savings through reduced bandwidth requirements. Combined with our diverse line of data termination units (DTUs), Alcatel feeder multiplexers and channel banks, the 3600 family of bandwidth managers is a central part of any complete, fully managed, end-to-end solution for your network.



ARCHITECTS OF AN INTERNET WORLD

Applications

The 3600 family accommodates your network's evolution (growth and changes in requirements) while protecting your investment. Alcatel large multiplexers reduce spare inventory and craft training by sharing common components and providing common user interfaces.

Upgrading an existing 3600-based network to frame relay and/or X.25 is as simple and economical as adding a single card. This is also true for applications such as LAN internetworking, Internet access and SNA.

3600 MainStreet Bandwidth Manager

This versatile performer is the most successful digital overlay platform ever built, with over 70,000 nodes installed worldwide. It can be used as:

- ▼ a medium capacity private or hybrid networking hub for circuit-switched voice and data, and packet-switched LAN and frame relay applications

- ▼ an intelligent channel bank providing carrier special services
- ▼ an international gateway node providing T1, E1 and ISDN interfaces with signaling, companding, and super-rate conversion, line and circuit grooming and voice compression

3645 MainStreet High Capacity Bandwidth Manager

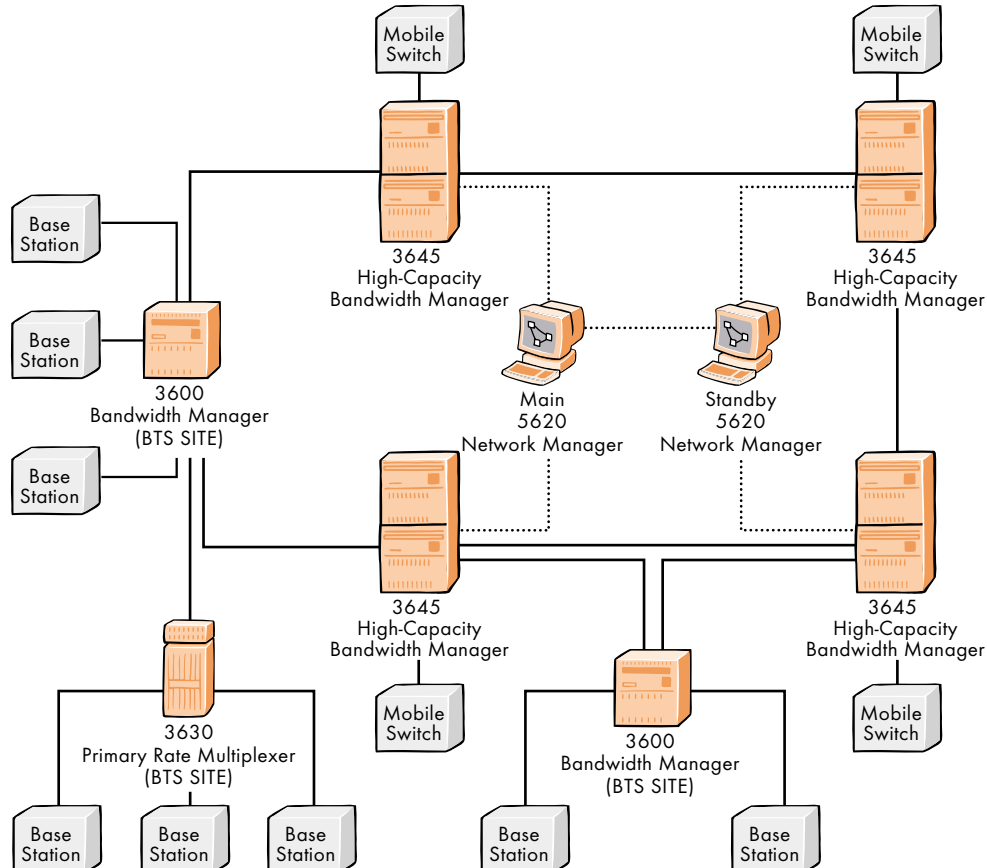
Offering superior granularity in a high capacity switch (3/0 DACS), it also supports all 3600 applications and can be used as:

- ▼ a high capacity hub, concentrating circuit-switched voice and data, and packet-switched LAN and frame relay traffic
- ▼ an integrated solution for common carriers, replacing DCSS, M13 multiplexers, patch panels, and international conversion units to provide any combination of up to 256 T1/E1, 8 DS3, or 16 E3 interfaces in a single standards-based system

3600+ MainStreet High Density Bandwidth Manager

An enhanced version of the industry-leading 3600, the 3600+ product's expanded bandwidth capabilities (up to SONET/SDH OC-3/STM-1 level) allow support for a new set of interfaces and a broader range of services. Offering more capacity in the

▼ **Figure 1: A wireless application shows the advantage of using the 3600 family for its ability to consolidate devices and traffic, as well as providing managed bandwidth across the network.**



backplane, this is a multiservice delivery vehicle for use in established and emerging carrier, large corporate network and end user applications. Some typical applications include:

- ▼ carrier special overlay networks
- ▼ corporate or utility integrated access or transport
- ▼ carrier integrated access

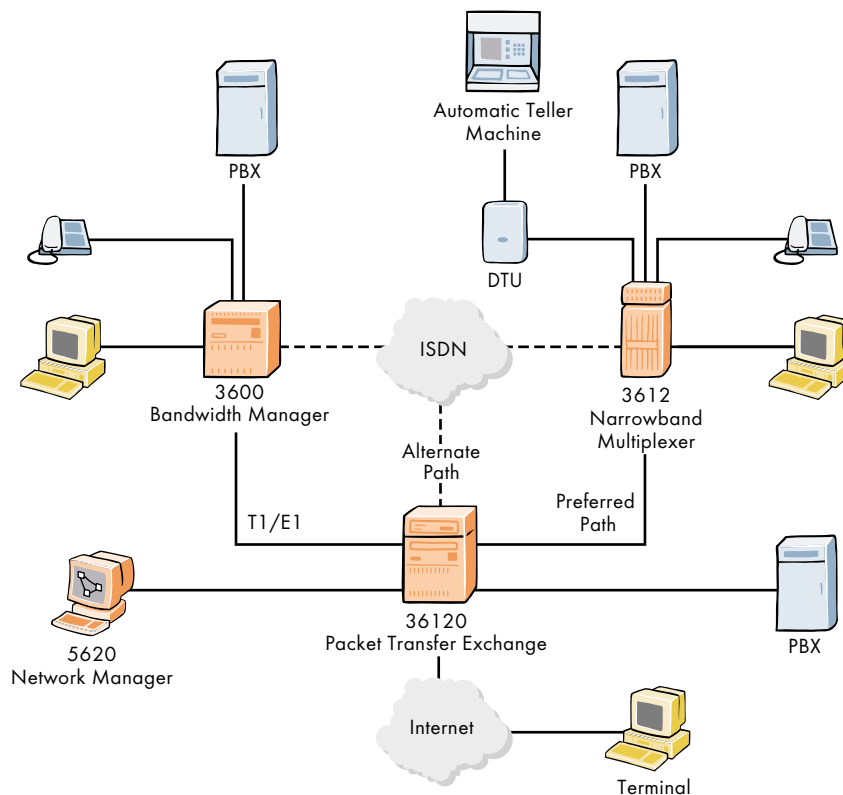
36120 MainStreet Packet Transfer Exchange

Fully configured for frame relay service delivery, this switch delivers aggregate switching performance up to 100,000 frames per second. It can also be configured as a multiservice switch, combining frame relay and X.25 services with all the integrated voice, data, LAN and special application features of the 3600 and 3645 products. It can be used as:

- ▼ a scalable, high capacity networking hub for high traffic concentration of packet switched frame relay and/or X.25 traffic
- ▼ an international gateway node providing bulk frame relay and/or X.25 switching service over DS3/E3/T1/E1 interfaces with signaling, companding, and super-rate conversion
- ▼ a combination of integrated voice and data multiplexer, intelligent channel bank, and digital cross-connect switch providing integrated packet switched frame relay and X.25, and circuit switched voice and data for carrier special services

▼ Figure 2: Corporate Service Network (Financial)

In this example, a financial institution aggregates its voice and data traffic from its branch offices (3612 Narrowband Multiplexer) and regional centers (3600 Bandwidth Manager) using the 36120 Packet Transfer Exchange as a central frame relay switch which also handles circuit switched traffic between the regional offices and headquarters. The 5620 Network Manager provides centrally located network management. The dial-up ISDN feature ensures backup in case of line failure for critical network reliability. By combining network consolidation products with frame relay technology, the company has created a distributed system, improved overall reliability and lowered its telecommunications costs.



3664 MainStreet Fractional Access Multiplexer

The most economical version of the family, this node can be used as:

- ▼ a medium capacity private or hybrid networking multiplexer
- ▼ an n^* 56/64 kb/s node
- ▼ an integrated feeder node providing fractional T1, E1 and ISDN interfaces with signaling, companding, and super-rate conversion, and line and circuit grooming

Architecture

The 3600 family is built around a range of components that are common to all large multiplexer systems. Universal card slot (UCS) cards provide interface and resource features for all members of the family. Shelves contain either 8 or 16 UCS cards as well as common control circuitry and power supplies. This reduces excess inventory and simplifies craft training across the whole Alcatel line. All Alcatel components are field-upgradable to provide a designed-in migration path as networking applications evolve.

The standards-based, modular architecture of the 3600 consists of one or two 19- or 23-inch (48.3 cm or 58.4 cm) shelves, each with 8 UCS slots, supporting up to 32 T1 or E1 interfaces and a 64 Mb/s, full duplex, non-blocking DS0 switching matrix.

The 3664 multiplexer consists of a single 3600 shelf supporting a full range of voice, data, and resource cards.

The 3600+ Bandwidth Manager consists of a single shelf supporting up to 16 UCS cards or higher bandwidth UCS+ cards, as well as three redundant high speed aggregate cards.

The 3645 High Capacity Bandwidth Manager builds on this modular architecture by connecting up to eight 3600 peripheral shelves and high speed peripheral shelves (HSPSs) to one switching shelf.

The switching shelf is the hub of the 3645; it provides central alarm monitoring, system wide control, and a non-blocking DS0 switching matrix for all peripheral shelves, as well as HSPSs for both one-way (unidirectional and broadcast) and two-way connections. DS3 and dual E3 cards provide copper trunk access and single E3 cards provide copper or fiber trunk access. The 36120 Packet Transfer Exchange (PTE) is built on the proven, standards-based, modular architecture of the 3600 Bandwidth Manager. PTE cards are interconnected by both the 100 Mb/s packet switched FASTbus and by the 64 Mb/s circuit switched shelf backplane bus. Any of the packet-switched cards (FRS, FRE, PTE) can also be utilized in any 3600 family product to provide packet switching capability.

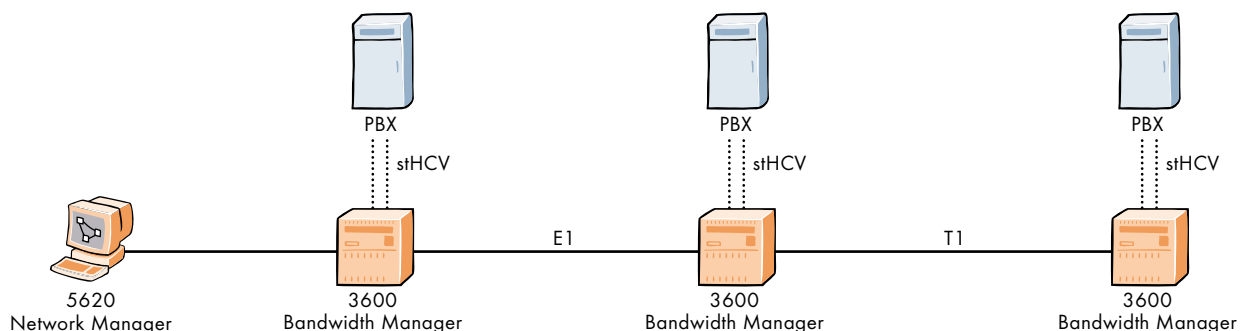
The control card (3600/64/120/+ systems) or switching cards (3645 systems) are optimized to manage DS0, primary rate and data cross-connections that identify frame streams – the shared bandwidth on which permanent virtual circuits (PVCs) are configured.

PTE cards are optimized to switch a PVC segment on one frame stream with a PVC segment on another. The FASTbus provides high speed, fault tolerant, shelf-to-shelf packet switching.

Network management

The Alcatel 5620 Network Manager (NM), formerly the 46020 Network Manager*, allows operators to control transmission network equipment using point-and-click path and parameter configuration. Operators can remotely configure nodes, monitor real-time operations, set up and manage path routes, perform diagnostics and isolate and manage network problems. The center-weighted approach to network management reduces internode control overhead on the network by storing system parameters in a non-volatile configuration database.

▼ **Figure 3: An international corporate voice network managed by the 5620 Network Manager. The 3600 product offers T1/E1 conversion and stHCV compression, a compression technology that eliminates decompression and recompression at each forwarding node in the network, thus improving final voice quality.**



When used in a network managed by a 5620 Network Manager, the 3600 family of bandwidth managers allows advanced partitioning capabilities to the time slot level so as to manage congestion, maintain cross-customer security and provision virtual private network services.

Flexible switching

DSO cross-connect switching is done by the common control circuitry, optimized to provide low transit delays. DSP card-based subrate multiplexing and switching applications supported include: DDS DSOA/ DSOB, I.460 X.50, high capacity multiplexing (HCM) and $n \times 8$ kb/s channels. For HCM, the switching resolution is 800 b/s. Packet switching cards can be installed to support high speed switching of multiple frame relay or X.25 channels.

The 36120 provides up to 512 Mb/s switching capacity, over any combination of up to 256 T1/E1, 8 DS3, or 16 E3 interfaces, carrying up to 3,698 frame streams and a total of 126,976 PVCs. This permits hybrid packet and circuit switched services on the same primary rate link.

The 3600+ Bandwidth Manager builds on the architecture of the successful 3600 product by providing wideband/ broadband, SONET/SDH switching functionality (VC/VT) in addition to increased narrowband switching capability. The 3600+ architecture allows for the development of higher bandwidth cards, such as unchannelized T3/E3, and octal T1/E1 to support increasing bandwidth needs and efficiency requirements.

36120 congestion and link management

The 36120 supports:

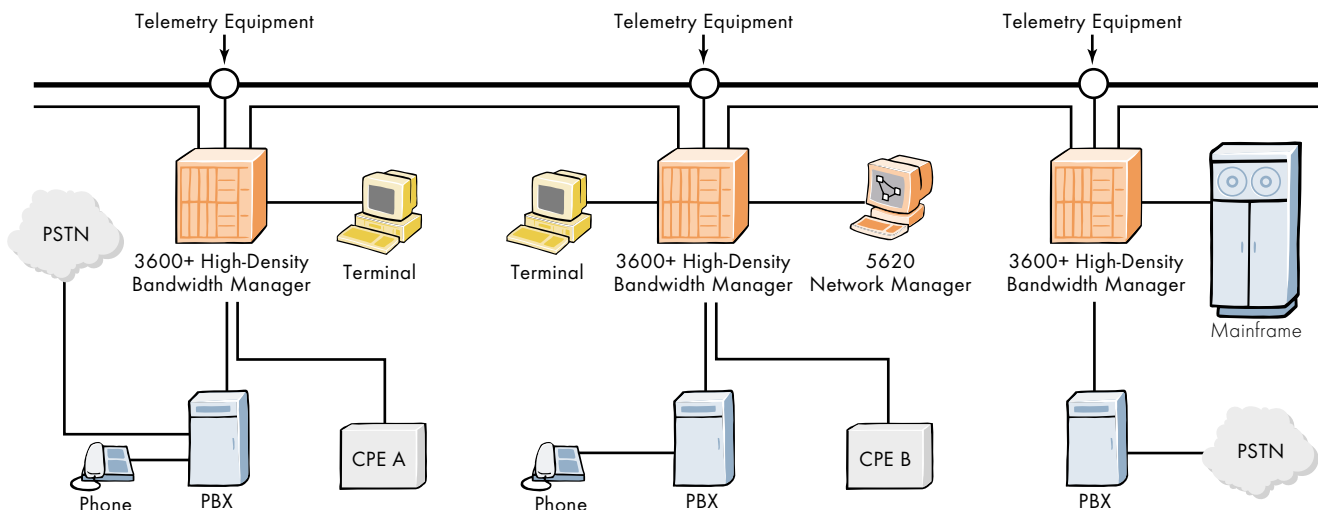
- ▼ threshold alarm levels for mild, severe and absolute congestion of frame streams, PVCs, frame switches, and the FASTbus interface
- ▼ forward and backward explicit congestion notification (FECN and BECN) bits
- ▼ the discard eligibility (DE) bit
- ▼ the user, network, and bi-directional modes of the LMI, ANSI T1.167 Annex D, and CCITT Q.933 Annex A link management protocols

Class of service parameters are fully configurable on a per PVC basis, including committed information rate (CIR), committed burst size (Bc), and excess burst size (Be).

Protection switching

All voice, data, aggregate and subrate aggregates can be preconfigured with a reserved alternate path with immediate diversion (RAPID) to provide fast rerouting of critical information channels. All primary rate interfaces can be configured for card redundancy. DS3 and E3 cards also provide access (link) redundancy. The FASTbus is based on a dual, counter-rotating ring topology that automatically bypasses PTE card or cable failures to maintain system operation.

▼ **Figure 4: This application shows a network that might be constructed by a national utility taking advantage of its existing right-of-ways. The 3600+ product provides access to a fiber-based transmission infrastructure using SONET/SDH, while providing fine enough granularity to handle $n \times 8$ kb/s voice channels using stHCV voice compression.**



The 3600+ network protection is provided by a unidirectional path switched ring (UPSR) and 1+1 link redundancy for SONET/ SDH applications and RAPID for network-wide protection of 64 kb/s services.

Voice interfaces

Analog voice channel access is provided through E&M, LGS cards (Loop/Ground Start Subscriber), LGE cards (Loop/Ground Start Exchange), and E&M, LGS, LGE, and manual ring down (MRD) channel units. Both internal and external ringing generators are supported for LGS and MRD interfaces. Digital voice access is provided through T1, E1 or V.35/X.21 PRI aggregate cards. Optional resource cards and modules provide a wide range of voice compression capabilities, including ADPCM, 8 and 16 kb/s HCV, LD-CELP and A-CELP. Alcatel patented stHCV functionality allows transport of compressed voice through tandem switches without any compression/decompression degradation.

Data interfaces

Data devices can be connected directly through V.24/RS232, V.32, V.35, X.21/V.11, RS422 (RS530A, V.36/RS449, X.21, or V.35), OCUDP, 4W T0 or 64 kb/s codirectional interfaces. Remote data devices can be connected through the 2B+D format, V.24/RS232, V.35, and X.21/V.11 interfaces of the Alcatel 2600 or 2700 MainStreet family of data termination units (DTUs).

Aggregate interfaces

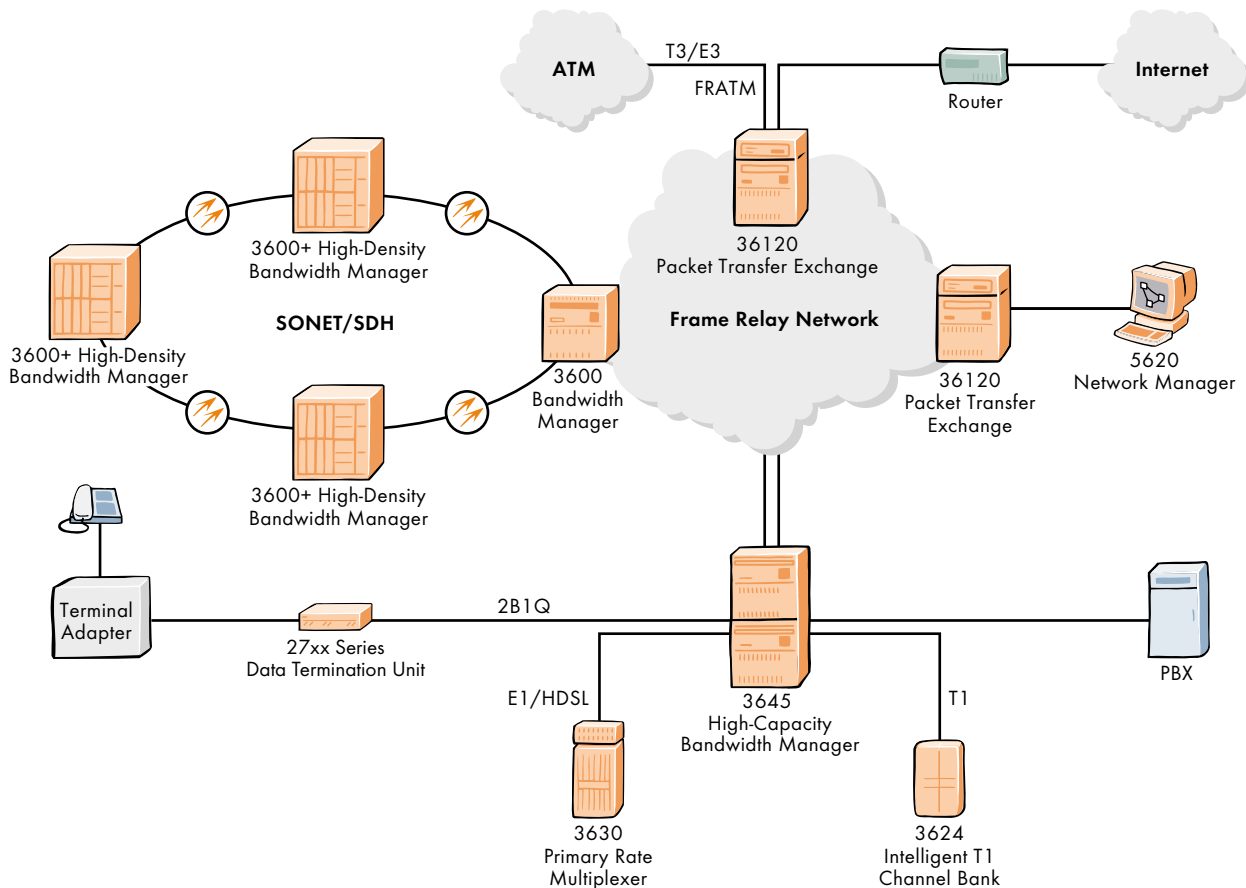
Aggregate access can be through channelized, fractional or full T1 or E1 interfaces, T3 or E3 (3645 only), STM-1 and OC-3 (3600+ only), $n \times 64$ kb/s, V.35 or X.21 PRI, or 56 kb/s, V.35 or X.21 PRI aggregates.

Resource cards

Resource cards available for the 3600 family include digital signal processing (DSP), data communications processor (DCP), call processor card (CPC), as well as the frame relay switch (FRS), frame relay engine (FRE) and packet engine (PE) for frame relay and X.25 applications.

▼ Figure 5: Multiservice Network

The Alcatel family offers a wide array of voice and data capabilities (circuit and packet) that allow the elegant introduction of multiple services on a single network. In this example, a local exchange carrier uses the 3645 as a subscriber traffic concentrator interconnected to a 36120 frame relay network, as well as a metropolitan area services network based on a 3600+ self-healing fiber ring. ATM backbone services are accessed through the 36120 FRATM. The 5620 Network Manager controls traffic across all flavors of the network.



Technical Summary

Voice Interfaces	3600	3645	3664	36120	3600+
E&M (Type I,II,III,V)	•	•	•	•	•
LS/GS Subscriber (LGS)	•	•	•	•	•
LS/GS Exchange (LGE)	•	•	•	•	•
T1 D4 and ESF formats	•	•	•	•	•
E1 CAS and CCS, R2D (E&M)	•	•	•	•	•
E&M, LGS, LGE, and MRD Channel Units	•	•	•	•	•
Data Interfaces	3600	3645	3664	36120	3600+
V.24 / V.28 / RS232-C	•	•	•	•	•
RS422 (4 full duplex interfaces independently configurable as RS 530A, V.36 / RS449, X.21 or V.35)	•	•	•	•	•
V.35	•	•	•	•	•
X.21 / V.11	•	•	•	•	•
OCU-DP AND 4WT0 Channel Units	•	•	•	•	•
64 kb/s codirectional (G.703 with AIS detection)	•	•	•	•	•
2B1Q Line Card (interfaced with 2700 DTUs)	•	•	•	•	•
DNIC Line Card (interfaced with 2600 DTUs)	•	•	•	•	•
Aggregate Interfaces	3600	3645	3664	36120	3600+
44.736 Mb/s DS3		•			
34 Mb/s E3		•			
1.544 Mb/s T1 (D4, ESF, 64 kb/s chan.)	•	•	•	•	•
2.048 Mb/s E1 (CAS, CCS, 64 kb/s chan.)	•	•	•	•	•
56 kb/s or n*64 kb/s V.35 PRI	•	•	•	•	•
56 kb/s or n*64 kb/s X.21 PRI	•	•	•	•	•
ISDN PRI	•	•	•	•	•
T1/E1 HDSL	•	•	•	•	•
Fractional T1 Module	•	•	•	•	•
ISDN S/T BRI Card	•	•	•	•	•
ISDN U BRI Card	•	•	•	•	•
Optical Extension E1	•	•	•	•	•
Optical Extension E3		•			
TTC-2M Card	•	•	•	•	•
OC-3 Card					•
STM-1 Card					•
Resource (Application) Cards	3600	3645	3664	36120	3600+
Data Communication Processor (DCP) Card	•	•	•	•	•
General Facilities Card	•	•	•	•	•
Test Card (metallic test access for carrier card)	•	•	•	•	•
DSP Applications	3600	3645	3664	36120	3600+
Voice Compression	•	•	•	•	•
▼ ADPCM (ITU G.721)					
▼ 8 and 16 kb/s HCV compression					
▼ 8 kb/s A-CELP (ITU G.729)					
▼ 16 kb/s LD-CELP (ITU G.728)					

Continued on page 8

* This product belonged to the Newbridge family. Newbridge was acquired by Alcatel in May 2000.

For more information www.cid.alcatel.com

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DSP Applications (continued)	3600	3645	3664	36120	3600+
G3 fax support (V.17) over compressed voice (14.4 kb/s max.)*		•	•	•	•
Modem (V.32bis) tones support over compressed (CELP) voice (14.4 kb/s)	•	•	•	•	•
Subrate multiplexing and switching of compressed voice and data		•	•	•	• •
Echo cancellation (26ms, G.165)	•	•	•	•	•
Voice conference bridging	•	•	•	•	•
Mu / A-law companding conversion	•	•	•	•	•
Multidrop PCM data bridging	•	•	•	•	•
1.460 (n*8 kb/s transparent) Multiplexing	•	•	•	•	•
High Capacity Multiplexing (HCM)	•	•	•	•	•
DDS and X.50 rate adaptation	•	•	•	•	•
Frame Relay / X.25	3600	3645	3664	36120	3600+
Frame Relay Switch (FRS) Card	•	•	•	•	•
Frame Relay Engine (FRE) Card	•	•		•	•
FRATM	†	†		•	†
X.25 Packet Engine (PE) Card	•	•		•	•
General	3600	3645	3664	36120	3600+
# of universal card slots	16	128	8	128	16
# of E1/T1 ports (Dual E1/T1 cards)	32	256	32	256	32
Shelf Sizes	19 – 23 in.	19 – 23 in. HSPS1 HSPS2	19 – 23 in.	19 – 23 in. HSPS1 HSPS2	19 in.

▼ With addition of FASTbus

Model/Shelf Type	Height	Width	Depth
3600/45 PU Class A 19"	48.51 cm (19.1 in.)	48.3 cm (19.0 in.)	24.64 or 25.9 cm (9.7 or 10.2 in.)
3600/45 PU Class B 19"	48.51 cm (19.1 in.)	48.3 cm (19.0 in.)	24.64 cm (9.7 in.)
3600/45 PU 23"	44.45 cm (17.5 in.)	58.4 cm (23.0 in.)	30.35 cm (11.95 in.)
3645 HSPS1	48.51 cm (19.1 in.)	48.3 cm (19.0 in.)	24.64 cm (9.7 in.)
3645 HSPS2†	57.79 cm (22.75 in.)	48.3 cm (19.0 in.)	30.48 cm (12.0 in.)
3600+	80.01 cm (31.5 in.)	48.3 cm (19.0 in.)	29.97 cm (12.0 in.)

Operating Environment (all models)

- ▼ 0° – 40° C (32° – 104° F), 5% – 95% relative humidity, noncondensing

Product Safety

- ▼ UL1950, CSA C22.2 No. 950, EN60950, IEC950

EMC Standards

- ▼ FCC Part 15, ICES-003, EN55022, EN50082, CISPR22

Network Attachment

- ▼ FCC Part 68, IC CS-03, CTR2, CTR3, CTR4, CTR12

Power (all models)

- ▼ Maximum power consumption per shelf: 3600/45/64/120 285 W AC, 260 W DC, 3600+ 550 W DC

Power Supplies

- ▼ Single and dual input load sharing: 48 V DC, -24 V DC, 120 V AC (60 Hz), and 240 V AC (50 Hz)
- ▼ 23-inch shelf and HSPS2 support dual load sharing power supply cards: 48 V DC
- ▼ 3600+ provides three load sharing power supplies (1:2 redundancy)

† Includes integral heat deflector

