Alcatel 1000 S12
Easy Migration to Broadband

ALCATEL
Abbreviations

ABCE  ATM Broadband Control Element
ADSI  Analog Display Services Interface
ALMA  Alcatel Management Application
ARCU  Alcatel Remote Concentrating Unit
AS  Access Switch
ASM  Analog Subscriber Module
ATM  Asynchronous Transfer Mode
ATOM  Advanced Terminal for Operations and Maintenance
BB  BroadBand
BSC  Base Station Controller
BTS  Base Transceiver Station
CLASS  Custom Local Area Signalling Services
DCN  Data Communication Network
DDF  Digital Distribution Frame
DSN  Digital Switching Network
DTM  Digital Trunk Module
GS  Group Switch
IBC  Integrated Broadband Communications
IMM  Interactive MultiMedia
IPTM  ISDN Packet Trunk Module
ISDN  Integrated Services Digital Network
ISM  ISDN Subscriber Module
JSSA  Small Stand-Alone Exchange (J-Rack)
LTE  Line Terminating Equipment (Transmission)
MD  Mediation Device
MPSR  Multi-Path Self-Routing
MSC  MultiSlot Cell / Mobile services Switching Center
NB  NarrowBand
NBCE  NarrowBand Control Element
NE  Network Element
OPS  Operator Position System
RSU  Remote Subscriber Unit
RTSU  Remote Terminal Sub Unit
SBC  SDH Broadband Control Element
SCE  Service Creation Environment
SCP  Service Control Point
SDH  Synchronous Digital Hierarchy
SLK  SDH Link Termination Board
SMP  Service Management Point
SPP  Service Provisioning Point
SRT  Self-Routing Tag
SSP  Service Switching Point
STM  Synchronous Transfer Mode
STM–1  Synchronous Transport Module, level 1 (SDH)
STP  Signalling Transfer Point
VC  Virtual Container
VOD  Video-On-Demand
Alcatel 1000 S12
a truly Future-Safe System

With more than 100 million lines in operation world-wide, the Alcatel 1000 S12 switching system, day after day, continually switches a very large portion of the telephone traffic of the world’s 700 million telephone lines. In the near future, telecommunications traffic will soar exponentially as an ever increasing avalanche of networked multimedia applications will hit the telecommunications infrastructure.

The Alcatel 1000 S12 switching system has a proven record of being a truly future-safe switching solution. During many years, its modular architecture allowed it to easily incorporate technological improvements as they emerged. Therefore, operators using the Alcatel 1000 S12 switch fully enjoyed the benefits of these technological improvements as they occurred. Those benefits ranged from low power consumption and small floor-space requirements, to a high level of maintainability and reliability and a full complement of versatile revenue generating features and services.
The same Alcatel 1000 S12 future-safe characteristics that allowed operators to reap the benefits of technology, will now once more allow operators to switch the soaring traffic that threatens to inundate the telecommunications network.

Operators that have consistently invested in the Alcatel 1000 S12 switching system, will find themselves in a favourable position, because they will be able to see the new traffic demands as an opportunity rather than as a threat. Indeed, based on the “Future Safe” characteristics of the Alcatel 1000 S12 switching system, Alcatel Telecom has a clear strategy for the migration of your Alcatel 1000 S12 narrowband switching machines into machines with broadband switching capability.

Read on and discover how Alcatel Telecom will migrate the Alcatel 1000 S12 switching system to the broadband era and how this will make of you an early player in the market of the Integrated Broadband Communications (IBC).
The Alcatel 1000 S12
Switching Strategy

It is Alcatel Telecom’s strategy to provide an evolution of the product portfolio from narrowband to a fully integrated narrowband/broadband product covering all network segments. The evolution will allow a seamless upgrade of an installed network infrastructure, as such making the best possible reuse of investments already made in your narrowband switches.

It will be possible to connect broadband links to any existing Alcatel 1000 S12 switching system. The interfaces will be integrated into the switch architecture without any impact on the already existing narrowband services. In this way, your Alcatel 1000 S12 machine will be able to serve as a platform for broadband services.

The interworking of narrowband and broadband services as an integrated functionality will make the Alcatel 1000 S12 switching system the most suitable system for the networked multimedia environment, supporting all types of future applications.

It is clear that implementing all this, at once, in a live exchange, holds a considerable risk for the operator. That is why Alcatel Telecom has opted for an approach in three phases. Every phase will have to prove its performance and reliability under live traffic conditions.

In the first phase, the existing narrowband group switch will be replaced with a broadband switch, while at the same time Synchronous Digital Hierarchy (SDH) links will be directly terminated at this switch. In the second phase, it will be possible to also connect ATM links to the switch. And finally the third step will bring full integration between narrowband and broadband with full interworking between narrowband- and broadband services.

The migration to broadband capability will not only apply for newly installed Alcatel 1000 S12 switches of the latest version. Each and every existing system in the field can be upgraded to accommodate broadband traffic. This broadband upgrade can be done during the busy hour without affecting live traffic.
Broadband enabling Technology

The MultiPath Self Routing Switch

The cornerstone of Alcatel Telecom’s strategy for the evolution of the Alcatel 1000 S12 switching system to broadband capability is the replacement of its narrowband Digital Switching Network (DSN) by an advanced, cell-oriented broadband switch: the new MultiPath Self-Routing (MPSR) switch.

The introduction of the MPSR into some of your narrowband Alcatel 1000 S12 switches will allow you to design your future IBC network with confidence inside your Alcatel 1000 S12 installed base.

The MultiPath Self-Routing switch is a cell-oriented switching fabric. The switch consists of a number of 155 Mbps input ports and the same number of such output ports. The information units that are carried on any input port consist of multi-slot cells (MSC’s), which can be switched by the network to any of the output ports.

An elementary slot is eight bytes long and the number of such slots contained in one MSC depends on the type of information that is being carried, such as ATM traffic, SDH VC12 traffic, ... Using such variable cell lengths achieves the internal switching mechanism’s independence of external transfer protocols.

The network has a multi-stage and a multi-plane architecture, in which the same identical switching element is repeated over and over again. This basic switching element is an application specific integrated circuit (ASIC), a silicon sliver of 14 by 15 mm, switching MSC’s from any of 16 input ports of 155 Mbps to 16 such output ports.

Eight of these ASIC’s are assembled on one printed board assembly (PBA), constituting a basic switch module: a switching matrix with 64 inlets and 64 outlets, each carrying information streams of 155 Mbps.

A number of identical basic switch modules are assembled in a network comprising up to 4 planes and up to two switching stages. Traffic is distributed randomly over the different planes and over the different switching elements of each plane. Hence, the failure of one switch element or even of an entire switching plane will not disrupt a connection.

Depending on the number of boards used, the capacity of the network can grow to a compound information throughput of up to 210 gigabit per second. This is equivalent to the traffic of approximately 3.3 million simultaneous telephone conversations.
Substituting the DSN for the MultiPath Self-Routing Switch

In a classical Alcatel 1000 S12 exchange, the Digital Switching Network (DSN) consists of the access switch stage (AS) and the group switch stages (GS). To upgrade an exchange to broadband switching capability, the group switch stages of the DSN must be replaced by the more powerful MPSR. The access switches, though, will remain in place as before, they will now connect the existing narrowband control elements to the MPSR.

Therefore it is required that the currently used internal 4 Mbps DSN transfer protocol is properly changed to the 155 Mbps protocol at the input ports of the MPSR. This is done by a module named InterWorking LinK (IWLK).
The new MPSR and IWLK modules are housed in a new rack which is rolled in next to the existing equipment racks. On-line replacement of the Group switch (GS) by the MPSR and the IWLK's is possible by changing the cabling between the access switches and the GS to the InterWorking LinKs plane by plane. The new network is put into operation and the old group switch network is decommissioned, without interrupting your revenue stream.

After this surgical transplantation the good old narrowband Alcatel 1000 S12 exchange has been made ready for a new life in the Integrated Broadband Communications era.
Phase 1: SDH directly connected within the Alcatel 1000 S12 Switch

Just as the InterWorking LinK connects the Access Switches to the MPSR, another new building block, the SDH-STM Link termination (SLK), connects up to four optical or electrical STM-1 interfaces directly to the MPSR. The SLK adapts the external SDH format to the internal MPSR protocol. Traffic coming in via the SDH link, is sent to another new building block, the SDH Broadband Control Element (SBCE). There the traffic \((n \times 64 \text{ kbps})\) is reflected and switched to the appropriate InterWorking LinKs, from where it is delivered to the destination narrowband termination. Or, alternatively, the traffic can be switched back to an SBCE in order to be switched to an STM-1 Link. The total capacity of an SBCE is 1,560 channels and the module can therefore be seen as a “super digital trunk”.

Owing to the powerful technology used, it is no longer necessary to multiplex and demultiplex the SDH streams externally from the switch, everything is done inside. It is clear that this technique results in very important savings in overall equipment cost when compared to the classical situation. Indeed, one does not need the external multiplexers/demultiplexers anymore, neither does one need an elaborate set of digital trunk modules (DTM’s), nor is there any longer a need for the intermediate digital distribution frame and its expensive cabling arrangements.

Use of these advanced technologies further leads to a number of indirect savings, such as floor space and power consumption savings and savings in switch management and maintenance owing to increased reliability.

Aggressive use of our technology will make you a champion in total cost-of-ownership reduction.
**Phase 2: Introduction of ATM Interfaces**

In a next step, ATM interfaces and services can be directly introduced within the new system organisation.

The SDH-ATM Link termination building block connects several 155 Mbps ATM links directly to the MPSR. This allows for semi-permanent and switched ATM services. At this stage, ATM cells can be switched from any physical ATM input stream to any physical ATM output stream.

The user perceives the system now as offering narrowband and broadband services on separate sets of physical interfaces. In other words, at this stage, there is as yet no interworking between the broadband and narrowband portions of the exchange.
Phase 3: Full Interworking of Narrowband and Broadband Switched Services

In the last step, Alcatel Telecom will realise the full interworking between narrowband and ATM broadband switched services. A device, called ABCE (ATM Broadband Control Element) will allow the full interworking between ATM-transport and 64 kbps STM transport.

The introduction of the ABCE will allow the use of an ATM backbone to carry broadband traffic as well as narrowband traffic. Furthermore, at this stage, full service interworking between multi-functional terminals of both narrowband and broadband subscribers can be realised.
Alcatel 1000 S12 Investment: Safe Investment

It is clear that with this strategy Alcatel Telecom will lead you seamlessly into the world of the integrated broadband communications while fully exploiting investments already made in the narrowband Alcatel 1000 S12 switching equipment. The narrowband switch will gradually grow into a high capacity switch, supporting all transport services.

Under an integrated management, the Alcatel 1000 S12 switch will fully support the interworking of all required switching services.

Your past, current and future investments in the Alcatel 1000 S12 Switching System family are your sure way into the era of the integrated broadband communications. The conclusion is easy: if you have invested in Alcatel 1000 S12 switching gear, you have invested safely.
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