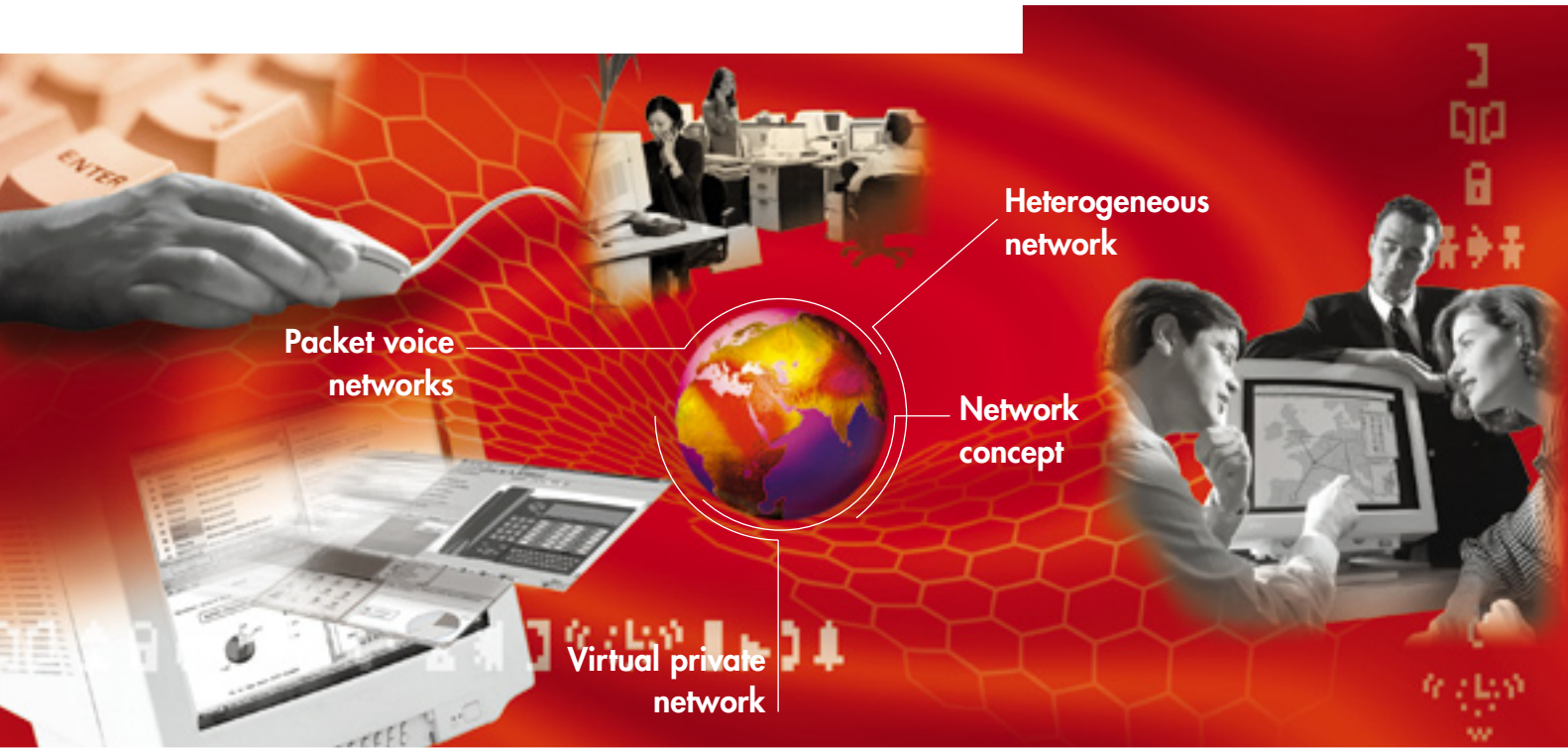
ALCATEL 4400

Networking and management solutions



New technologies, market deregulation, and worldwide economy information encourage companies to streamline their communications in a single network. With the Alcatel 4400 at the heart of your communication strategy, you can put voice, data and people together.

ALCATEL

▶Network concept

The Alcatel 4400 runs on the ABC (Alcatel Business Communication) protocol. This protocol is designed to cope with all topologies and transport infrastructures, and is based on four modules offering the following services:

➨ **Telephone features**
This module, called ABC-F, provides complete telephone feature transparency.

➨ **Applications**
This module, called ABC-A offers enhanced network wide applications, either as centralised or distributed solutions.

➨ **Routing**
The core of the built-in routing protocol, called ABC-R, is based on a unique mechanism, adaptive routing, which optimises the size of network links and improves security as a whole. On top of that the protocol handle mechanisms designed to reduce costs such as: least cost routing, automatic route selection, forced on-net, break-in, break-out and link optimisation on transfer.

➨ **Management**
The ABC-M module guarantees consistency of databases between nodes and management stations. It uses the broadcasting and audit mechanisms to inform the whole network about configuration changes and safeguards the system with centralised alarms.

▶Packet voice network

Fuelled by the fast evolution of enabling technologies such as packet voice, new opportunities of network unification have arisen together with the possibility to reduce costs and deliver innovative services. These new connectivity options lead to more network choice: Voice over IP, Voice over Frame Relay, Voice over ATM networks, and even packet voice over traditional circuit networks.

▶Virtual Private Network (VPN)

New carrier tariff policies create opportunities for networks using switched infrastructures of public operators. Alcatel has developed Virtual Private Network solutions to optimise both cost and performance. In addition, the use of packet voice and compression technology dramatically improves the cost effectiveness of existing voice networks.

▶Heterogeneous network

Alcatel supports openness and standardisation. Thus the Alcatel 4400 offers interconnection based on both QSIG and legacy protocols, eg.: DPNSS. More importantly, the ABC protocol is a superset of QSIG and aims to further improve the quality and performance of the Alcatel 4400's in multi vendor environments.

Network concept

In this new era where information is becoming a key success factor, the trend is to network the whole enterprise, with the right cost/performance ratio from HQ, branches and down to the nomadic worker. In line with this new trend, the Alcatel 4400 offers attractive and versatile solutions slashing communication expenses, whilst still retaining a consistent service level throughout the company.

The aim is to address the whole company including very small branches, so we have increased the network capacity to:

- 100 nodes
- 50 000 subscribers
- 60 000 phone book entries

For either campus or small branches Alcatel proposes, in addition to classical solutions, a distributed concept called "Remote Crystal", and a package called "Voice hub".

➨ Remote Crystal

This is an Alcatel 4400 remote shelf connected to the main Crystal.
The Remote Crystal is the solution for a distributed architecture on a large campus, making use of existing structured cabling system. It is also a cost optimised solution for small sites that need utmost homogeneity. An other application of this remote shelf is to be a DECT radio base station controller when extended coverage is required.

- Remote Crystal based on fiber optic (INTOF board):
  - Full feature transparency
  - DECT hand-over and roaming between crystals
  - Multi-mode or mono-mode fiber optic
  - 4x8 Mbit/s connection between remote shelf and main Crystal

- Remote Crystal based on copper cabling (INTOF board):
  - Full feature transparency
  - DECT hand-over and roaming between Crystals
  - 4x8 Mbit/s connection between remote shelf and main Crystal

- Remote Crystal over public leased line (RT2 board)
  - Full feature transparency
  - Local switching for Remote Crystal communications
  - DECT roaming between Crystals
  - E1 or fractional E1 connection between Remote shelf and main Crystal

➨ Voice hub

The Voice hub meets two goals. In standard configuration, this package is a cost optimised solution for networked small sites. With the optional patch panel, the Voice hub is similar to the data hub concept. This package is a 19-inch rack mounted device that fits in the data cabinet located close to the desktop, using the same structured cabling system as data communication (copper & fiber optic). This architecture dramatically reduces installation, trouble shooting and maintenance costs.

- Remote Crystal based on fiber optic
In campus, Remote Crystal for decentralised installation using INTOF board for fiber optics connection.

- Remote Crystal over public network
With the Voice hub as a Remote Crystal on another site, this package uses E1/T1 or fractional E1/T1 links.

- Small node for networks
The Voice hub is equipped with its own CPU and is integrated in an Alcatel 4400 multi-site network based on ABC protocol.

Packet voice network

The classical network solutions are based on digital leased lines typically E1/T1 or fractional E1/T1. But as a result of the increasingly liberalised telecom market and technology evolution, there are now real opportunities to deploy flexible and cost effective innovative networking solutions.

➨ Integrated compression engine

The traditional transport of voice over ISDN circuits used to require 64Kbs per second. These days are now over thanks to the new Alcatel 4400 advanced compression module which allows up to 6 simultaneous calls into the traditional 64 Kbs channel. This is not the only advantage, packet voice also offers new flexibility and opens up to voice company data packet networks.

Characteristics:

- 6 compression modules are integrated in the following boards:
  - LIO P, (PRA access)
  - LIO B, (4 BRA access, plus one X24/V11or V36 access)
  - LIO X, (auxiliary)
- Compression algorithm: G723.1
- Compression rate: 6.4 Kbs
- Integrated echo cancellation
- Fax G3 up to 9600 Bps
- MF Q23 codes interpreted, coded and regenerated
- Lost frames interpolation
- Silence suppression and regeneration
- End to end compression/ decompression
- Voice frame fragmentation (reducing delay)
- Mutual aid between compression resources
- Two directions per board

➨ Voice over IP network

The implementation of Voice over IP services on the Alcatel 4400 provides new cost/quality ratio together with high quality voice services. Voice over IP implementation provides full ABC networking feature transparency thanks to the multiplexing of voice and signalling on Alcatel 4400 links.

VoIP gateway characteristics:

- LIO E Board
- 30 voice channels per board
- Four boards maximum
- Multiplexing of 90 channels on one board
- Compression algorithm: G711, G723.1
- Echo cancellation
- Real time fax (fax relay)
- Dynamic jitter buffer
- Client RAS protocol with gatekeeper
- Inter node transit
- Multiple VoIP bundles
- Allocation of the compression algorithm:
  - Static
  - Per bundle between Alcatel 4400
  - Call by call with H 323 device
- Call rerouting for new calls:
  - In case of IP network failure
  - QoS problems (call by call)
- Management fully integrated with management platforms 47XX
- Broadcast of gateway data

➨ Voice over FR network

As Frame Relay technology becomes more and more mature, it is particularly useful to interconnect sites with small to medium traffic. The Alcatel 4400 provides Frame Relay integrated solutions connecting either private or public Frame Relay switches.

Characteristics:

- LIO B Board
- Interface X24/V11 or V36
- Interface speed 64, 128 Kbps
- 6 integrated compression resources per board
- 12 voice channels
- 4 directions per board
- Compression algorithm: G723.1
- Compression rate: 6,4 Kbs
- Integrated echo cancellation
- Fax G3 up to 9600 Bps
- MF Q23 codes interpreted, coded and regenerated
- Lost frames interpolation
- Silence suppression and regeneration
- End to end compression/ decompression
- Data frame fragmentation (reducing delay)
- Mutual help between compression resources

➨ Voice over ATM network

Today many campus communication infrastructures migrate to ATM. It is the right way to integrate legacy data traffic with other company information flows when real time is critical. Alcatel 4400 supports native ATM connectivity providing seamless integration of voice and ABC services over ATM networks.

- ATM Interface 155 Mbits/s (STM1/OC3)
- Multiplexing of E1 trunks in ATM cells
- 4 ATM boards per Alcatel 4400
- 8 E1/T1 trunks (240 channels) per board
- Compliant with integrated compression auxiliaries
- Segmentation and Re-assembly (SAR)
- ATM adaptation Layer 1 (AAL 1)
- Unstructured mode (CES 1.0) using Permanent Virtual Circuits (PVC's)
- Support of 8 directions (PVC's) per interface

Virtual private network

Networking small sites with low or medium voice traffic does not always justify dedicated leased lines. As a result of infrastructure evolution, carriers can offer an increasing number of switched connections combined with attractive tariffs. The Alcatel 4400 supports versatile virtual solutions offering real advantages.

➨ *ABC-VPN*

ABC-VPN solution targets peak traffic and full VPN architectures. Expensive leased lines are sized according to the average traffic. When leased lines are saturated, communications are transparently routed accross the digital public switched network with or without integrated compression. This is the right way to reduce costs and increase availability. Full VPN architectures require only one permanent low speed connection for signalling. The whole voice traffic is handled by public switched digital connections with or without integrated compression.

- Compliant with public networks type R2, QSIG, ISDN
- Integrated compression over QSIG and ISDN networks

The Alcatel 4400 uses a disassociated signalling concept, ABC signalling is transported via other networks:

- TCP/IP data network
- V 24 synchronous modem link
- PLL X.25 in ISDN D-channel
- Leased line D-channel
- ISDN B-channel

➨ *ABC on demand*

This solution makes it possible to build up a powerful private voice network over public switched network without a permanent connection. This application combines an integrated voice compression engine and signalling on demand. When required, one B channel is set up between two nodes. This "virtual leased line" transports the network signalling and the compressed voice. Up to six communications in the same B channel are supported. The "Virtual leased line" is released when there is no more private traffic. This solution targets networks located in the same cost area, and combines great flexibility and tremendous cost savings.

- Compliant with public networks type QSIG, ISDN

➨ *Analogue ABC*

Analogue ABC uses analogue leased lines for voice traffic. Analogue ABC is interesting for international networks and countries with attractive tariffs for analogue links. In addition, existing legacy networks based on analogue lines could be boosted with full ABC feature transparency. In this environment the disassociated signalling also provides full ABC feature transparency and is transported via alternative networks such as:

- V 24 synchronous modem links
- X.25 in ISDN D-channel (PLL)
- IP

➨ *ISVPN*

This solution stands for ISDN based VPN and uses a D-channel service of public networks called User to User Signalling (UUS1). Availability of UUS1 depends on carrier offers. ISVPN is a networking solution with implementation of all basic networking features

ISVPN services:

- Homogeneous numbering plan (using virtual DDI)
- Overflow to ISVPN number
- Transfer on no reply and in conversation
- Call forwarding
- Enquiry call
- Call back request
- Name and number identification
- Path optimisation (avoiding loops)
- Centralised attendant
- Intrusion

All networking solutions such as networks based on digital or analogue leased lines, on IP, FR, ATM transport infrastructures, on ABC-VPN or VPN on demand, interwork perfectly and provide a consistent and unique level of service. The Alcatel 4400 networking solutions offer a real virtual private communication system.

➨ ***ABC-F: Telephone features***

- 29 party meet me conference
- Basic call
- Broker's call
- Call forwarding
- Call waiting indication
- Call offer
- Call back on busy links
- Call back on busy extensions
- Call back on free
- Call park
- Call deflection
- Camp on
- Data communication
- Distinctive ringing based on hierarchies
- DTMF services
- Hold, enquiry, alternating
- Homogeneous numbering
- Intercom call
- Internal short number dialling (ISD)
- Intrusion
- ISDN services
- Mini text messaging
- Network call handling
- Number and name identification
- Open private numbering plan
- Overflow on associate
- Substitution
- Three party conference
- Transfer (with route optimisation)
- Transit

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➨ ***ABC-F: Distributed groupware features***

- Associate in network
- Individual call pick up
- Manager/secretary function extended to networking context: Line supervision, filtering scenarios
- Supervision in network configuration (free, busy reachable, busy total, ringing)
- Virtual hunting groups

➨ ***ABC-F: Mobility features***

- DECT in network: roaming, user rights and accounting allocated to home node number
- Paging services in networks
- Ubiquity services
- Remote forwarding
- Substitution

➨ ***ABC-A: Networking applications***

Attendants services

- Call distribution for decentralised and centralised attendants
- Call distribution in attendant groups (parallel, cyclic)
- Class of traffic indication on line keys (local call, external call, overflow...)
- Entity routing for multi-company multi-department services
- Multi-tenant services
- Traffic overflow for attendant group or attendants based on caller waiting time
- Traffic overflow with look ahead routing
- Status management (day/night/ forwarding) for entity and attendant groups
- Large busy lamp field supervision

Centralised directory

- Directory clients connected to directory server via TCP/IP
- Dumb terminals connected via V 24
- Real time update with 4400 directory

Voice mail

- Centralised or shared voice mails distributed in network
- Message waiting in networks
- Voice mail management integrated in subscriber management

ACD

- Centralised ACD supervisor in network with real time supervision
- Mutual aid between ACD groups in different nodes with look ahead call routing
- Virtual agent groups

➨ ***ABC-R: Routing mechanism***

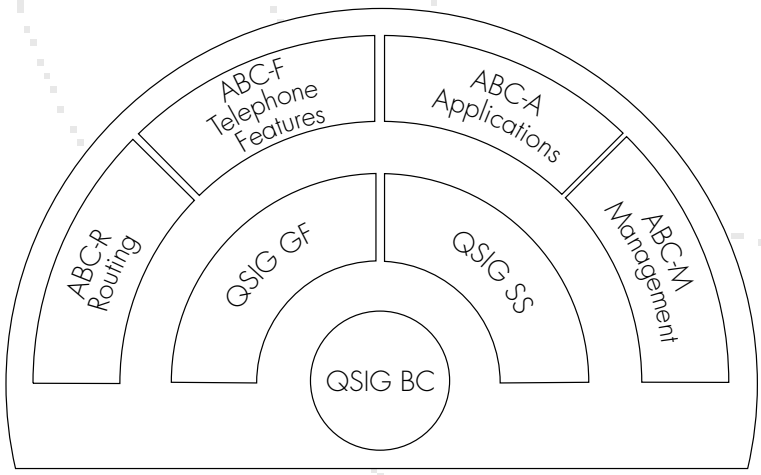
- Flexible numbering plan
- Multi public translators
- Multi-tenant ARS
- Multiple DDI translators
- Multiple call barring translators
- Adaptive routing
- Private to public overflow (according to user rights)
- Forced on-net
- Break-in,
- Break-out

● Automatic Route Selection
- ARS server centralised or distributed
- 20 000 directions
- 1000 route lists
- 1 to 30 analysed digits
- Dialling command tables with add/delete digits for number translation
- ARS time dependant: day of the week, hour and minute of the day
- 100 weekly tables
- 5 daily tables per weekly table
- Up to 30 numbers in dialling command table
- Direct or indirect multi-carrier access
- 5 routes per direction
- Access to alternative routes based on caller rights
- Cost limit barring per user/ installation status
- Information (voice prompt) to caller if he has no right to use a more expensive route
- Information (voice prompt) to callers if cheapest route is not available

➨ ***ABC-M: Management features***

These management functions are integrated in the ABC networking protocol, to facilitate and secure the administration of a system with the Alcatel management stations. Interconnection to the Alcatel 4400 is ensured by native Ethernet connectivity using state-of-the-art protocol stacks on top of TCP/IP.

● Centralised alarms
● Broadcast functionality
● Audit service



Heterogeneous networking

Alcatel supports openness and standardisation. Thus the Alcatel 4400 provides networking solutions based on legacy protocols such as DPNSS as well as standards such as QSIG.

The Alcatel 4400 includes 3 QSIG functions:

➨ ***QSIG Basic Call***

This allows multi vendor networks to be built, based on basic ISDN telephony features:

- Calling line identification
- Connecting line identification
- Data calls bearer
- Malicious call identification
- Sub address

➨ ***QSIG Generic Function protocol***

This part of the QSIG standardisation makes homogenous end to end networking over a third party network node possible. This is also important for networking with new carriers when integrating QSIG GF.

➨ ***QSIG - Supplementary services***

Alcatel always remains up to date with the latest QSIG upgrades and commits itself to testing these features with the main global market players. Supplementary services are available on the Alcatel 4400 (more available with ongoing standardisation):

- Advice of charge
- Call completion on busy and no reply
- Call offer
- Intrusion
- Do not disturb
- Name identification
- Optimised transfer and forwarding
- Path replacement

➨ ***DPNSS***

DPNSS is integrated in the Alcatel 4400 and inter working with the ABC protocol: Services supported are the following:

- Voice and data call
- Call back when free
- Intrusion
- Call forwarding
- Hold
- Enquiry call
- Transfer
- Conference
- Call offer
- Service independent string
- Call waiting
- Route optimisation
- Centralised night service
- Do not disturb
- Loop avoidance

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www.alcatel.com