RES: RES: DILIGÊNCIA - Pregão Eletrônico DPRJ Nº 020/22

De : Bruno Silva <bruno.silva@3corp.com.br> qua., 16 de nov. de 2022 20:05
Assunto : RES: RES: DILIGÊNCIA - Pregão Eletrônico DPRJ Nº 020/22 14 anexos
Para : Adriano Ribeiro Braganca <adriano.braganca@defensoria.rj.def.br>
Cc : VINÍCIUS MURAT DO CARMO <vinicius.carmo@defensoria.rj.def.br>, Layane Oliveira Basse <layane.basse@3corp.com.br>, NÚCLEO DE LICITAÇÕES <nulic@defensoria.rj.def.br>

Adriano, boa tarde!

Segue resposta da nossa área técnica referente as diligências solicitadas pelo órgão.

1. Nos documentos apresentados (proposta e qualificação) não fica evidenciado qual será a estratégia a ser adotada pela LICITANTE para atender ao item 6.1.4. *"A solução deverá estar hospedada em datacenters com redundância geográfica que possuam no mínimo as certificações ISO 27001, ISO 27017, ISO 27018, SOC1, SOC2, SOC3, PCI DSS, CSA STAR E HITRUST CSF, caso não possuam as certificações acima listadas, também será aceita a certificação Tier3"*. A proposta técnica apresentada não traz qualquer informação sobre a possível localização do datacenter, desta forma, solicitamos **esclarecer como se dará a "hospedagem da solução" em atendimento ao referido item do TR.**

RESPOSTA 3 CORP> A solução proposta está hospedada em 2 Data Centers distintos onde ambos possuem cerificação Tier 3. A aplicação possui redundância geográfica entre os dois DataCenters conforme trecho abaixo do documento 12_Topology_Network_Services_ENT_MLE_035075_01_en.pdf na página 25 " Communication Server spatial redundancy".

Data Center 1: Odata em Barueri (vide certificação Tier III em anexo)

Data Center 2 : Vivo em Santana de Parnaíba (vide certificação Tier III em anexo)

3.2.11 Business continuity in case of Communication Server switch-over

Network established ongoing communications are maintained, even if an IP/ABC Link or hybrid TDM Link is involved in the communication. Thus, business continuity is offered between endpoints (IP Touch, legacy devices/ trunks, SIP devices/trunks, soft clients for OpenTouch users, equipment connected to another Communication Server, through ABC/IP Trunk Group or ABC TDM Links) belonging to different Communication Servers.

- Peer-to-peer communications in conversation state are maintained
- In set-up phase, communications are released except for incoming external communications, which are routed to the relevant entity (e.g. an attendant)
- Conferences are not maintained and communication on hold will be either distributed in function of entity (for external communication) or released
- Communications involving attendant, automated attendant, IVR, voice mail, nomadic are released

The evolution of the communication (from calling party or called party) is not handled during the switch-over (except for hanging up, press the release key, hands-free/ handset switch-over, mute activation/deactivation, level of loudspeaker management). However, at the end of switch-over (new established link between the two Communication Servers), the communication can evolve as before.

For IP and hybrid links, the network communication cannot evolve during the switch-over (40-60 seconds.). Nevertheless, users can:

- Alternate between hands-free / handset
- Mute/ un-mute
- Modify the loudspeaker level
- Release the call (hang-up, press the release key)

The devices are not reachable and are seen out of service during switch-over.

This feature does not require additional new fees and it is compatible with:

- IP Touch Security deployment
- Communication Server spatial redundancy

2. Nos documentos apresentados (proposta e qualificação) não fica evidenciado qual será a estratégia a ser adotada pela LICITANTE para atender ao item 9.17. *"A CONTRATADA deverá fornecer os links de comunicação para o funcionamento dos serviços contratados, obrigatoriamente implementados por meio de fibra óptica, não sendo permitidos acessos via satélite, pares metálicos e por rádio"*.
Ainda sobre essa exigência, ressaltamos o que dispõe o item 3.15. *"A fim de facilitar o correto dimensionamento das propostas, disponibilizamos no ANEXO I - LOCALIDADES E ESTIMATIVAS DE RAMAIS a planta atual da DPRJ contendo os endereços das Sedes e quantidades mínimas de ramais a serem solicitados num primeiro momento. É importante ressaltar que os ramais serão solicitados de acordo com as necessidades da Defensoria, não sendo esta listagem taxativa, devendo ser utilizada apenas como base para dimensionamento das propostas".*

Assim, solicitamos que seja apresentada pela licitante a estratégia de instalação dos links em fibra óptica em mais de 170 locais de forma a atender integralmente ao TR, podendo ser considerado inclusive a planta atualmente instalada da licitante.

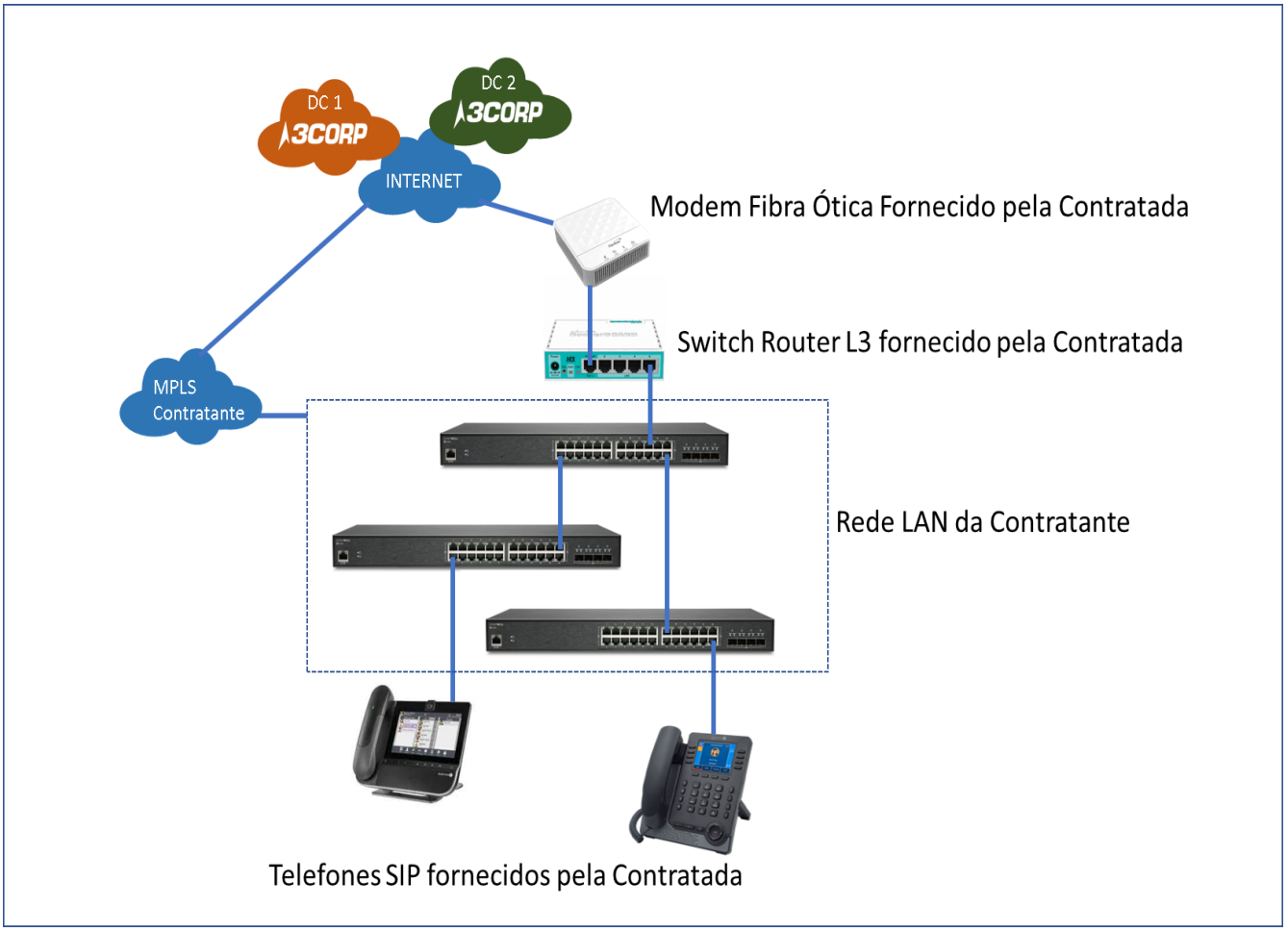
RESPOSTA 3 CORP> A contratada fornecerá links de internet baseados em Fibra Ótica em todas as localidades descritas no edital na medida que for solicitado a instalação de Ramais IP em cada endereço. O prazo médio de instalação de um link de Fibra ótica é de 20 dias corridos a partir da data de solicitação pela Contratante e de 45 dias para links dedicados. Vide planilha em anexo com a lista de endereços com suas respectivas larguras de bandas.

3. Nos documentos apresentados (proposta e qualificação) não foram apresentadas as especificações dos equipamentos que atenderão ao item 3.4 *"É importante ressaltar que em caso de indisponibilidade da*

saída de internet principal fornecida pela CONTRATADA, a solução deve automaticamente migrar para a rede MPLS da CONTRATANTE até o restabelecimento do serviço, quando deverá voltar a operar automaticamente pelo link da CONTRATADA".

Quanto ao item 3, solicitamos que sejam apresentadas pela licitante as especificações do equipamento que será utilizado para atender ao requisito de contingência conforme item 3.4. do TR.

RESPOSTA 3 CORP> A solução proposta contempla um Modem FTTH que recebe o link de Fibra Óptica das operadoras de última milha. Neste elemento será conectado um Switch Router L3 Gerenciável que fará a função de gerenciamento de rotas distintas entre o link da Contratada e/ou link de internet proveniente da rede MPLS da Contratante. Sendo assim o a rede MPLS da contratante poderá ser utilizada como link contingente para que os terminais SIP possam alcançar a plataforma de telefonia IP hospedada pela contratada. O equipamento a ser entregue em cada localidade será composto por um modem FTTH e um Switch Router MikroTik Hex (vide datasheet em anexo) .



Desde já agradeço, e me coloco a disposição em caso de dúvidas.

Atenciosamente,

Bruno Ferreira da Silva
Assistente Administrativo de Governo / Government Administrative Assistant
Telefone (11) 4450-6072
Site www.3corp.com.br **Email** **bruno.silva@3corp.com.br**
Alameda Oceania, 56, Tamboré - Santana de Parnaíba
CEP: 06.543-001

De: Adriano Ribeiro Braganca <adriano.braganca@defensoria.rj.def.br>
Enviada em: quarta-feira, 16 de novembro de 2022 16:20
Para: Bruno Silva <bruno.silva@3corp.com.br>
Cc: VINÍCIUS MURAT DO CARMO <vinicius.carmo@defensoria.rj.def.br>; Layane Oliveira Basse <layane.basse@3corp.com.br>; Governo <governo@3corp.com.br>; NÚCLEO DE LICITAÇÕES <nulic@defensoria.rj.def.br>
Assunto: Re: RES: DILIGÊNCIA - Pregão Eletrônico DPRJ Nº 020/22

Prezados,

Reitero a diligência abaixo. Ressalto que o prazo se encerra hoje.

Att,

Adriano Ribeiro Bragança
(21) 99763-9451

De: "Bruno Silva" <bruno.silva@3corp.com.br>
Para: "VINÍCIUS MURAT DO CARMO" <vinicius.carmo@defensoria.rj.def.br>, "Layane Oliveira Basse" <layane.basse@3corp.com.br>, "Governo" <governo@3corp.com.br>
Cc: "NÚCLEO DE LICITAÇÕES" <nulic@defensoria.rj.def.br>
Enviadas: Segunda-feira, 7 de novembro de 2022 16:13:42
Assunto: RES: DILIGÊNCIA - Pregão Eletrônico DPRJ Nº 020/22

Prezado Vinicius, boa tarde!

Acuso o recebimento e informo que já encaminhamos para análise e resposta da nossa área técnica.

Atenciosamente,

Bruno Ferreira da Silva
Assistente Administrativo de Governo / Government Administrative Assistant
Telefone (11) 4450-6072
Site www.3corp.com.br **Email** **bruno.silva@3corp.com.br**
Alameda Oceania, 56, Tamboré - Santana de Parnaíba
CEP: 06.543-001

De: VINÍCIUS MURAT DO CARMO <vinicius.carmo@defensoria.rj.def.br>
Enviada em: segunda-feira, 7 de novembro de 2022 16:11
Para: Bruno Silva <bruno.silva@3corp.com.br>; Layane Oliveira Basse <layane.basse@3corp.com.br>; Governo <governo@3corp.com.br>
Cc: NÚCLEO DE LICITAÇÕES <nulic@defensoria.rj.def.br>
Assunto: DILIGÊNCIA - Pregão Eletrônico DPRJ Nº 020/22

Ref.: Processo E-20/001.001010/2021. Licitação por Pregão Eletrônico DPRJ Nº 020/22, referente à CONTRATAÇÃO DE EMPRESA PARA PRESTAÇÃO DO SERVIÇO DE TELEFONIA IP COM PLATAFORMA DE PABX EM NUVEM, SOB DEMANDA, INCLUINDO OS RECURSOS DE ACESSO AO SERVIÇO DE TELEFONIA FIXA COMUTADA (STFC), NAS MODALIDADES LOCAL, LONGA DISTÂNCIA NACIONAL E INTERNACIONAL. SERVIÇO DE 0800 PARA RECEBIMENTO DE LIGAÇÕES GRATUITAS (LOCAL E DDD) E TRIDÍGITO 129 RESERVADO PARA AS DEFENSORIAS PÚBLICAS. INCLUINDO OS SERVIÇOS DE INSTALAÇÃO, CONFIGURAÇÃO, SUPORTE, MANUTENÇÃO, TREINAMENTO, BEM COMO O FORNECIMENTO DE LINKS, GATEWAYS, ATAS, TELEFONES IP, ENTRE OUTROS EQUIPAMENTOS NECESSÁRIOS PARA O FUNCIONAMENTO DOS SERVIÇOS CONTRATADOS.

O Pregoeiro nos termos do art. 43, § 3º da Lei 8666/93, resolve baixar diligência para fins de esclarecimento dos seguintes pontos:

1. Nos documentos apresentados (proposta e qualificação) não fica evidenciado qual será a estratégia a ser adotada pela LICITANTE para atender ao item 6.1.4. *"A solução deverá estar hospedada em datacenters com redundância geográfica que possuam no mínimo as certificações ISO 27001, ISO 27017, ISO 27018, SOC1, SOC2, SOC3, PCI DSS, CSA STAR E HITRUST CSF, caso não possuam as certificações acima listadas, também será aceita a certificação Tier3"*. A proposta técnica

apresentada não traz qualquer informação sobre a possível localização do datacenter, desta forma, solicitamos **esclarecer como se dará a "hospedagem da solução" em atendimento ao referido item do TR.**

2. Nos documentos apresentados (proposta e qualificação) não fica evidenciado qual será a estratégia a ser adotada pela LICITANTE para atender ao item 9.17. *"A CONTRATADA deverá fornecer os links de comunicação para o funcionamento dos serviços contratados, obrigatoriamente implementados por meio de fibra óptica, não sendo permitidos acessos via satélite, pares metálicos e por rádio"*.

Ainda sobre essa exigência, ressaltamos o que dispõe o item 3.15. *"A fim de facilitar o correto dimensionamento das propostas, disponibilizamos no ANEXO I - LOCALIDADES E ESTIMATIVAS DE RAMAIS a planta atual da DPRJ contendo os endereços das Sedes e quantidades mínimas de ramais a serem solicitados num primeiro momento. É importante ressaltar que os ramais serão solicitados de acordo com as necessidades da Defensoria, não sendo esta listagem taxativa, devendo ser utilizada apenas como base para dimensionamento das propostas".*

Assim, solicitamos que seja apresentada pela licitante a estratégia de instalação dos links em fibra óptica em mais de 170 locais de forma a atender integralmente ao TR, podendo ser considerado inclusive a planta atualmente instalada da licitante.

3. Nos documentos apresentados (proposta e qualificação) não foram apresentadas as especificações dos equipamentos que atenderão ao item 3.4 *"É importante ressaltar que em caso de indisponibilidade da saída de internet principal fornecida pela CONTRATADA, a solução deve automaticamente migrar para a rede MPLS da CONTRATANTE até o restabelecimento do serviço, quando deverá voltar a operar automaticamente pelo link da CONTRATADA"*.

Quanto ao item 3, solicitamos que sejam apresentadas pela licitante as especificações do equipamento que será utilizado para atender ao requisito de contingência conforme item 3.4. do TR.

O prazo para resposta é de 5 dias úteis, qual seja, até o dia 16/11/2022.

Favor, confirmar recebimento.

Atenciosamente,

VINÍCIUS MURAT DO CARMO
Pregoeiro / Equipe de Apoio
NULIC - Núcleo de Licitações
Tel.: 21 2332-6203 / 21 99826-6377
DEFENSORIA PÚBLICA
DO ESTADO DO RIO DE JANEIRO

- **3CORP TECHNOLOGY_Termo de Aceite do Projeto.pdf**
  167 KB
- **CERTIFICADO UPTIME.pdf**
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- **12_Topology_Network_Services_ENT_MLE_035075_01_en.pdf**
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vivo EMPRESAS	**Termo de Aceite do Projeto**	INFORMAÇÃO RESERVADA

À
[3CORP TECHNOLOGY INFRAESTRUTURA DE TELECOM LTDA.]

A/C Danilo Russo | danilo.russo@3corp.com.br

Notificamos que em **16/08/2022** foi concluída a atividade solicitada para o projeto **[T1DMND3860275 – COLOCATION - 3CORP TECHNOLOGY INFRAESTRUTURA DE TELECOM LTDA]**

Escopo – Pedido: 1581876
Rack – TBI 01x Instalação 1/3 Rack (14 Us e 2 KVAs nominais) Golden Jumper 01x Golden Jumper - UTP Cat6 Link Telefonica - CINZA (95 mts) INTERNET (Comp.) - TB I 10x FAIXA Mb (1 Mbps) Hands-and-Eyes 03x Hands-and-Eyes Elétrica 02x Circuitos elétricos redundantes PDU 02x Réguas de energia (8 pontos cada)

Conforme cláusula da proposta técnica comercial, providenciar a aceitação ou rejeição dos serviços entregues pela Vivo em um prazo máximo de 3 (três) dias corridos a contar da data de ativação. Ultrapassado este prazo, sem que haja qualquer manifestação de problema técnico por parte do cliente, devidamente registrados com evidências técnicas de indisponibilidade ou mal funcionamento do serviço, os serviços serão considerados tacitamente aceitos.

São Paulo, 25 de agosto de 2022.

Cristiano Vieira da Silva

Consultor Customer Success Implementation Data Center
Gerência Customer Success Implementation
Diretoria Customer Success B2B

Please be environment conscious
and print this document only if necessary

Alcatel·Lucent Enterprise

Alcatel-Lucent Hybrid Cloud Communications

Standard Offer

Chapter 12 - Topology – Network Services

April 2020 Offer - Ed.1 with April 2020 Golden RFP
Ref.: ENT_MLE_035075EN

Legal notice

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Who Should Use this Document?

As an introductory offer, this document can be used by ALE International vendors, clients, partners and associates involved with the implementation of ALE International systems.

Table of contents

Note: this chapter concerns the OmniPCX Enterprise only. For the OpenTouch Message Services, or OpenTouch Message Services integration in OmniPCX Enterprise networks, see the corresponding OpenTouch documents.

1 Topology overview - deployment design

The OmniPCX Enterprise Communication Server is part of the next generation of enterprise IP-PBX communication systems. It is designed around native IP technologies and allows the customer to deploy mixed or legacy solutions to support a converged data-voice network.

The OmniPCX Enterprise Communication Server architecture provides a single logical communication system whose benefits are:

- Scalability and ability to increase system performance and increase the number of supported users: flexible solutions for businesses of all sizes
- Resiliency and reliability, producing a highly stable service level consistent with its use
- Easy access from anywhere: communication solutions fit to all types of user profiles
- Technologically transparent: smooth migration of existing network
- Easily upgradeable and future-proof: protect and leverage existing investments

This flexible architecture allows the OmniPCX Enterprise Communication Server to be installed and operated in a totally distributed design configuration on a single site (campus) or across multiple sites.

The OmniPCX Enterprise Communication Server is designed to meet the needs of all types of architectures and configurations. The choice of a telecommunication solution is mainly based on topology and architecture. OmniPCX Enterprise Communication Server solutions can address the following deployment models, offering state-of-the-art telephony services:

- A single-system for a local environment. The simplest package is based on a single Appliance configuration containing embedded applications.
- Depending on the licenses, users can access the Messaging, Conferencing, Collaboration, Security services.
- A **centralized** call handling system with distributed hardware solution for a campus environment or multi-site environments (e.g. branch offices). A centralized call handling implies a central OmniPCX Enterprise Communication Server, controlling one or more remote Media Gateways, located locally or in remote sites
- A **distributed** call handling system with distributed hardware solution for multi-site environments. A distributed call handling implies several OmniPCX Enterprise Communication Servers. The OmniPCX Enterprise Communication Server can be networked to cover multiple buildings, sites, or campuses, at various geographic locations. In these types of configurations, each OmniPCX Enterprise Communication Server is considered as a network node

OmniPCX Enterprise Communication Server solutions are not limited by the network infrastructure and can operate on IP (H.323 and SIP included) and TDM.

These different types of infrastructure can co-exist in the enterprise.

The OmniPCX Enterprise allows a network consisting of several sites to be built with a high level of service integration and transparency. It also allows interconnection with legacy PBXs or with next generation IP-PBXs using digital TDM or IP technology.

2 Distributed architecture with centralized call control

In a distributed architecture with centralized call control, only one communication server handles calls (although it may be duplicated for standby) for all sites. The OmniPCX Enterprise Communication Server is supported on an IP appliance server (IP AS), an IP rack server (IPRS), or an IP crystal server (IPCS). The server is typically installed at the central site.

2.1 Basic architectural configurations

The platform choices for both communication servers and media gateways provide a maximum number of combinations to fulfill customer needs. Among the main advantages are:

- Flexibility: platforms to meet any size of company up to 100,000 users (telephony features are the same for all the users regardless of their location)
- Scalability: possible accumulation of media gateways either linked via IP or TDM
- Backup: possible separation of platforms:
  - Between communication servers and media gateways (the server is placed in the Application Server for best maintenance and backup practices)
  - Between main and standby communication servers for geographical separation (different physical locations, or "spatial redundancy—duplication")
- **Smooth transition** from a full TDM to mixed or full IP configuration

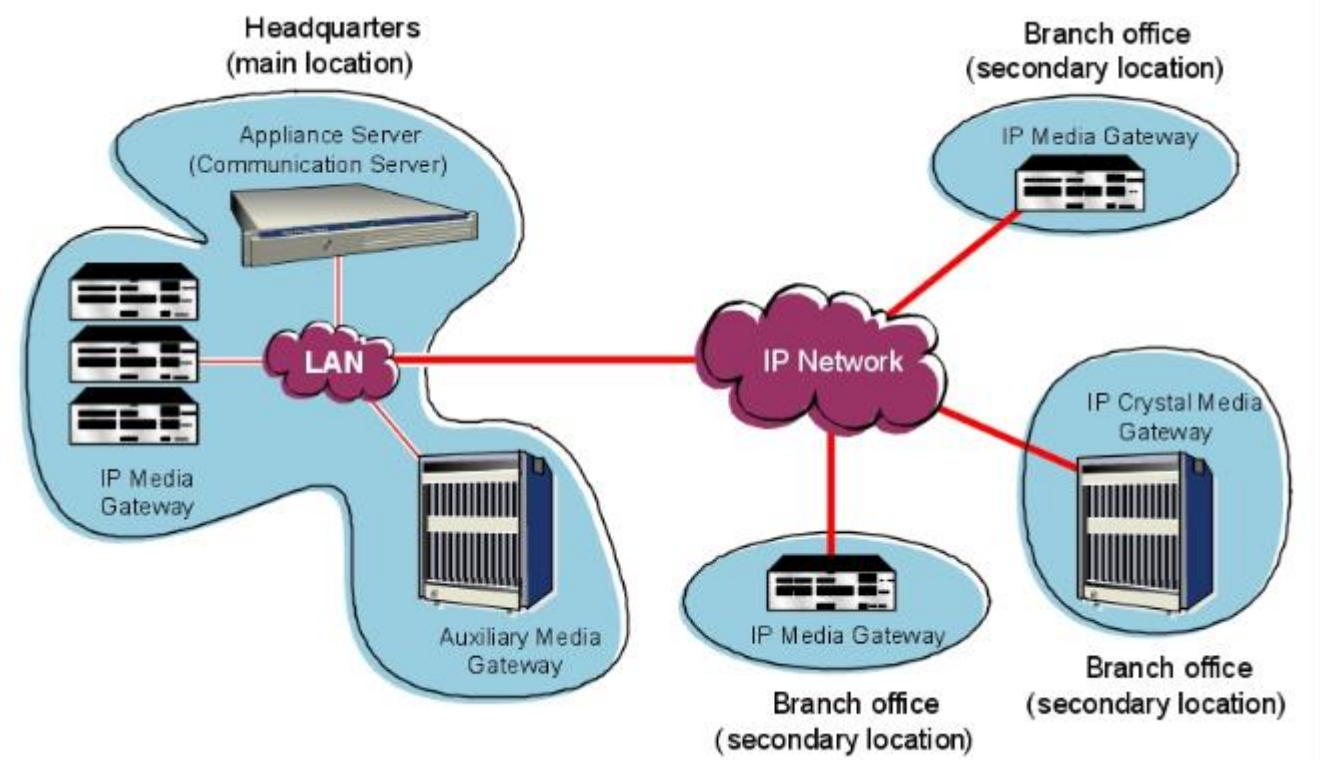
A number of restrictions exist in mixing different kinds of platforms. They are summarized in the following table:

Type of Communication Server (CPU) in main location	**Main location**	**Secondary - remote - location**
IP Appliance Server or Blade Center	Common hardware IP media gateway OR Crystal IP media gateway (possibly with one level of peripheral Crystals)	Common hardware IP media gateway OR Crystal IP media gateway
IP Crystal Server	Crystal Communication Server (possibly with two levels of peripheral Crystals)	Common hardware IP media gateway OR Crystal IP media gateway
IP Rack Server	Crystal IP media gateway AND Auxiliary media gateway (if necessary)	Common hardware IP media gateway OR Crystal IP media gateway

Possible example configurations are described in the following sections.

2.1.1 Media gateway example

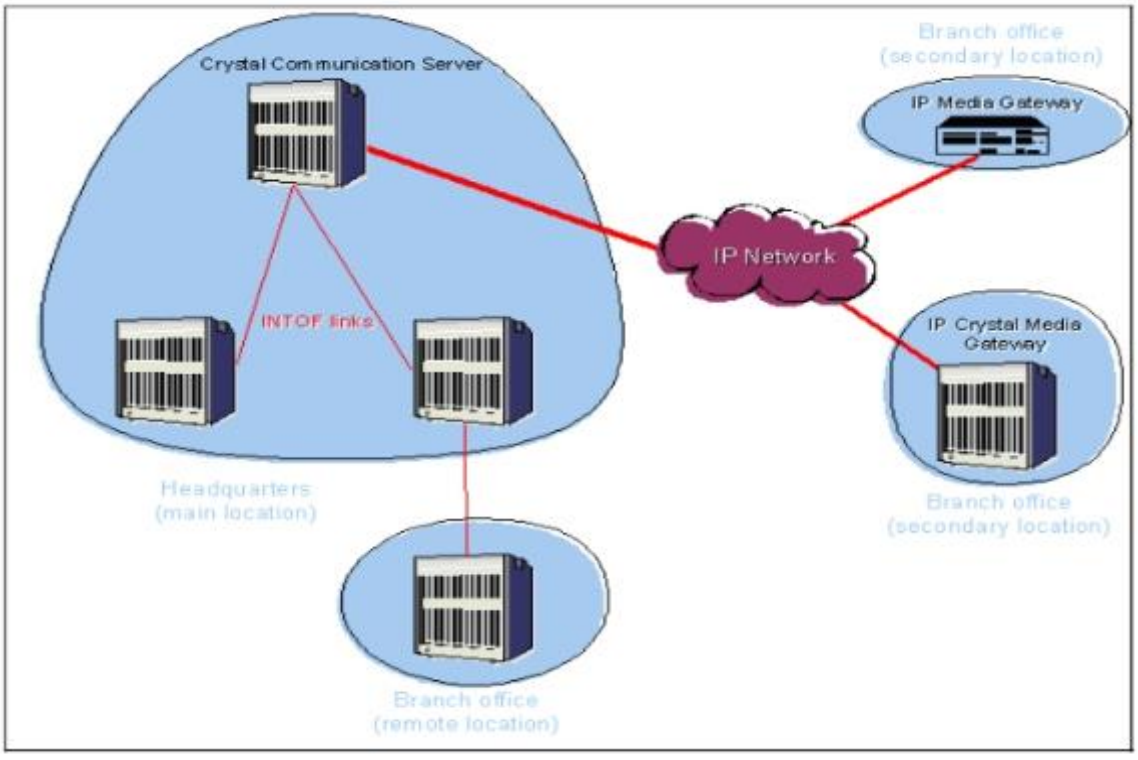
The following figure illustrates a configuration based on an IP media gateway. In the main location, an auxiliary media gateway is used for additional features (large DECT configurations, 4645 voice mail server).



2.1.2 TDM and media gateway example

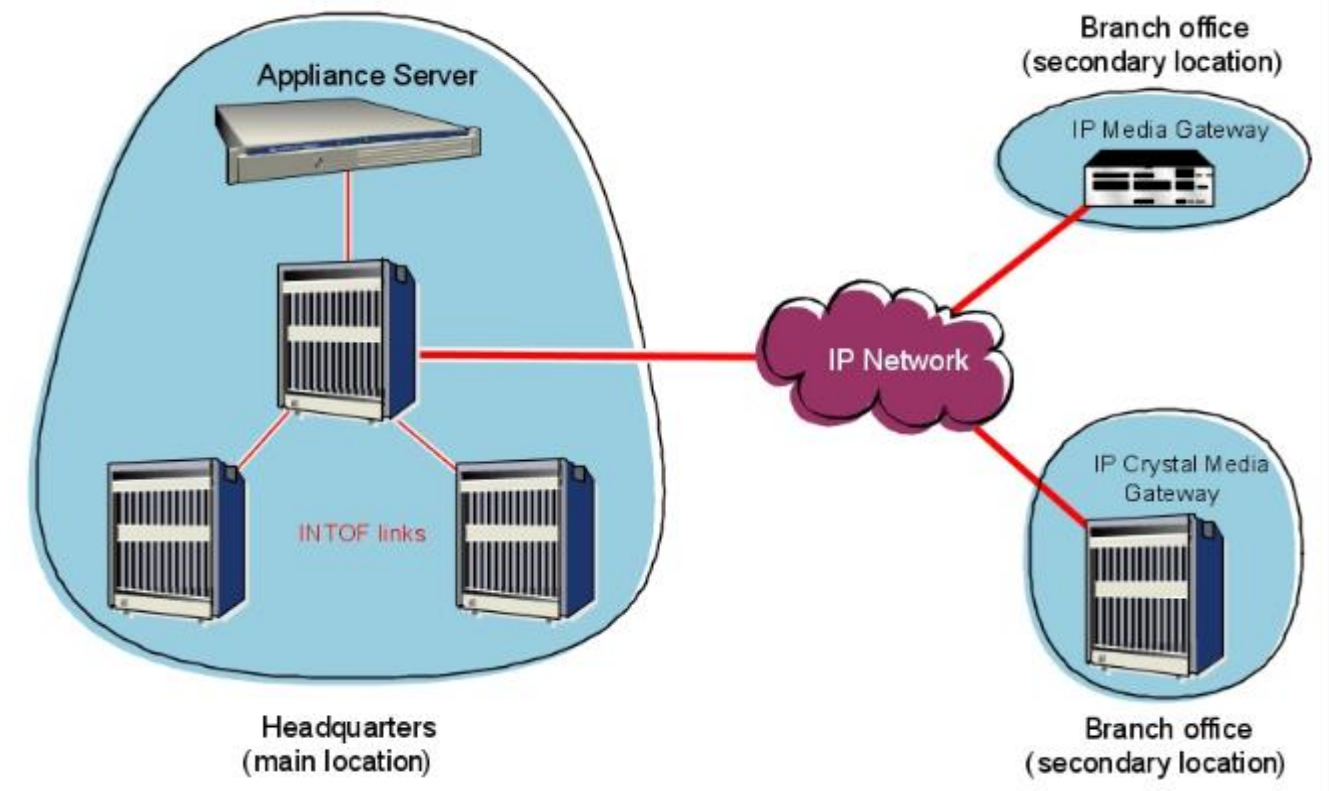
This configuration shows a full TDM system for the main location (headquarters), possibly resulting from an OmniPCX Enterprise migration. One branch office is equipped with a Remote Crystal shelf linked to the multi-level ACT structure.

To take advantage of the IP network, new branch offices are equipped with IP (Crystal and IP media gateways).



2.1.3 TDM and Appliance Server example

This configuration shows a full TDM system in the main location, but uses an IPAS placed in a secure location. In this case, the number of Crystal chains is limited to two. All branch offices are equipped with IP (Crystal) media gateways.



2.2 Interconnecting IP media gateways

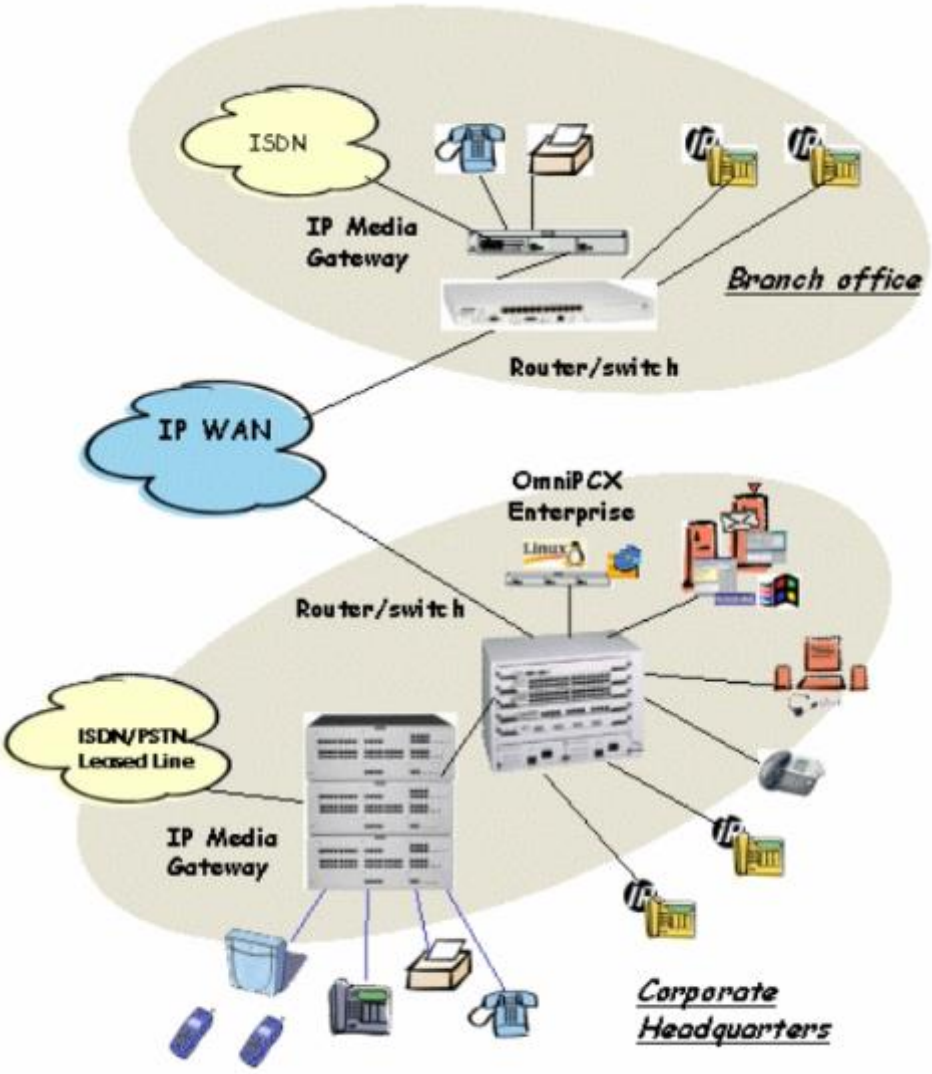
The Communication Server architecture requires a voice enabled IP network interconnecting each business site (physical connections often based on routers over frame relay or leased lines).

Typically, IPMGs are interconnected through the data network (LAN or WAN). Optical fibers can also be used (avoids using the customer data network in campus network). This is based on the use of integrated LAN boards (LAN 16) and devices called media converters, which convert 10/100BaseT Ethernet for transmission over fiber (these devices are not provided by ALE International).

Remote sites can be equipped with:

- IP telephony only, with small analog VoIP gateways for fax support (for example, Audiocodes MP1x)
- IP telephones as well as complementary media gateways for legacy interfaces (NDDI / NDID analog networks, Z (analog), digital T0, T1, or T2)
- Media gateways used to connect digital phones, fax machines, analog phones, and DECT base stations to the network

The remote equipment is controlled over the IP network (typically a WAN). All inter-site connections use VoIP. In most cases, a typical remote site configuration has between one and 50 extensions.



The OmniPCX Enterprise Communication Server can control up to 240 racks (IP Rack Module and IP Crystal Rack), distributed over an IP-based WAN, with a maximum of 90 IP Crystal Server racks.

Note: An IP media gateway (IPMG) consists of one, two, or three racks. An IP Crystal media gateway has one rack.

2.2.1 Configuration

Configuring an IP Media Gateway is easy. It consists of:

- Cabling
- IP parameter programming [dynamic (DHCP) or static IP addressing (through craft port V24)]
- Overall functional control of local equipment

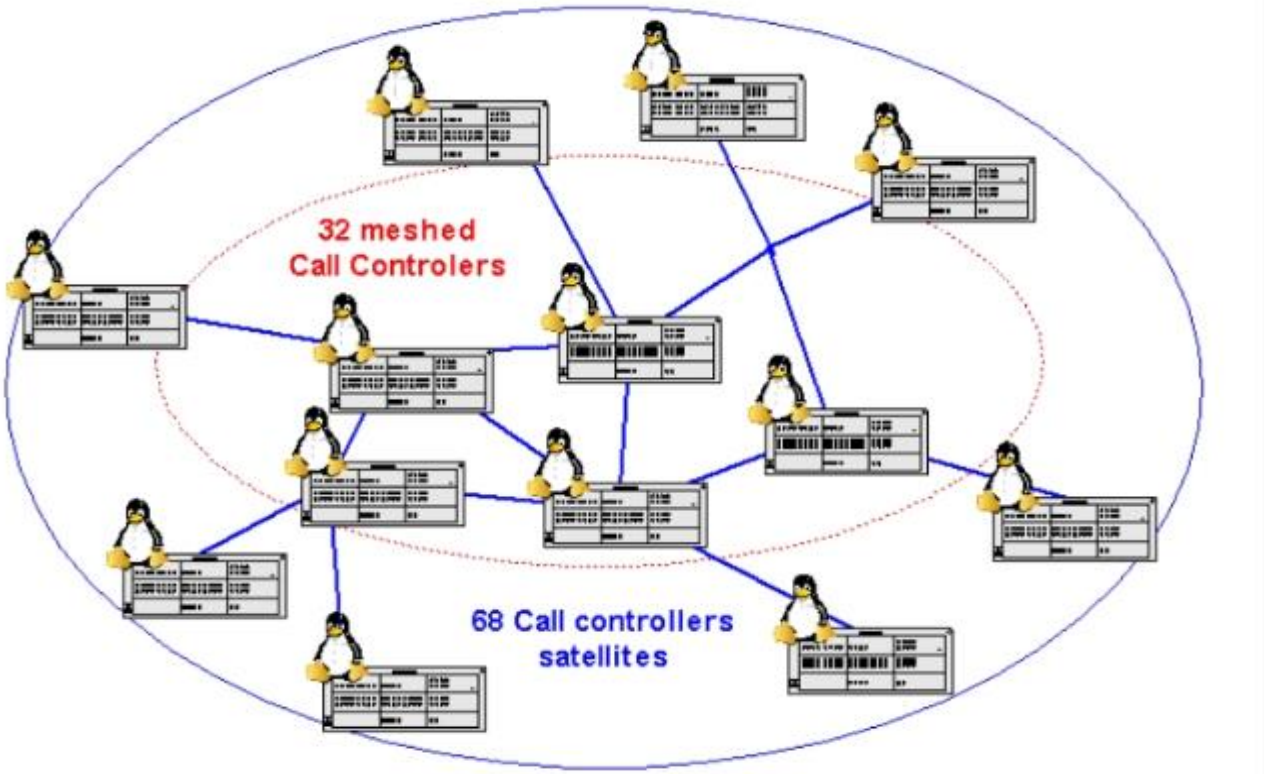
2.2.2 Maintenance

Maintenance (moves, adds, changes, or changes to user service parameters) is simplified and is performed by the central organization.

3 Distributed architecture with networking call control

3.1 Corporate ABC networking: infrastructure

The OmniPCX Enterprise Communication Server can support up to 100,000 users (TDM, DECT, IP) using various geographic design topologies (legacy or IP). In case of a legacy topology (TDM), the networked configuration can support up to 32 fully/partially meshed Communication Servers and 68 satellite Communication Servers for a total network configuration of 100 systems with full transparent features.

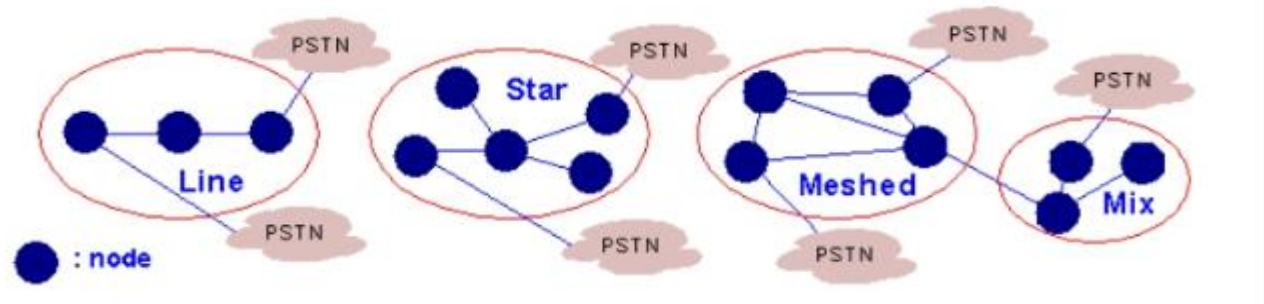


The networked solution uses the powerful Alcatel-Lucent Business Communications (ABC) protocol, which is based on and compatible with ETSI QSIG.

The OmniPCX Enterprise Communication Server can be networked in various topologies: line, star, full meshed, or a combination of these.

In general, interconnections are made through:

- TDM leased lines
- ABC-VPN over ISDN/PSTN
- IP



Homogeneous networks may consist of OmniPCX Enterprise Communication Server R10.0 nodes only, or may include nodes of OmniPCX Enterprise Communication Servers R10.0, R9.0, R8.0, R8.0.1 and R7.1.

If in the customer network, some nodes run in releases under 9.0, a smooth transition is still possible by interconnecting nodes in different versions during a controlled migration period. During this specific period, in a same homogeneous network, for instance, you can have a node in release 8.0.1 and another one in R10.0.

This allows customers to migrate on a node-by-node basis without compromising existing services or features.

Restrictions on features

When a new ABC-F2 service is introduced in a software release, this service can only be handled on a system with the same software release level ("end-to-end service"). However, due to the "message transparency" service included in the ABC-F2 protocol, nodes running a lower level of software release can route new messages.

Implementing "disallowed" configurations can lead to poor VoIP quality because of voice compression/decompression cycles. Guidelines are available to build a VoIP solution that ensures the best possible voice quality and interactivity to voice communication over an IP network.

3.1.1 Private network configurations and scalability

Supranetwork (More than 100 nodes)

Several homogeneous OmniPCX Enterprise Communication Server networks can be linked together in an extended configuration called a "supranetwork." In a supra-network, homogeneous networks (made of 1 to 100 nodes) are linked together through a TDM ABC-F Trunk Group or an IP ABC-F Trunk Group.

An ABC-F Trunk Group will be used instead of an ABC link to:

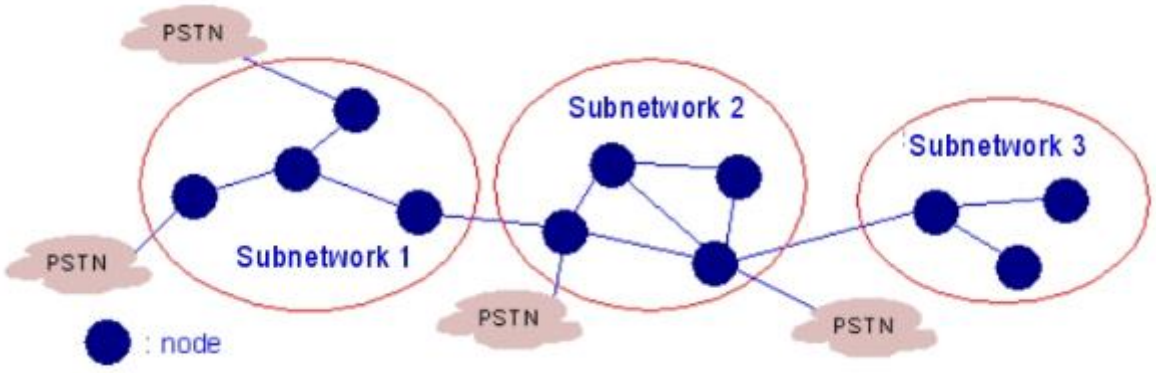
- Answer scalability requests (above 100 nodes or above 100 000 terminals in a sub-network; up to 250 sub-networks)
- Cope with customer requirements in terms of organization or/and numbering plan:

Each sub-network can be fully managed independently.

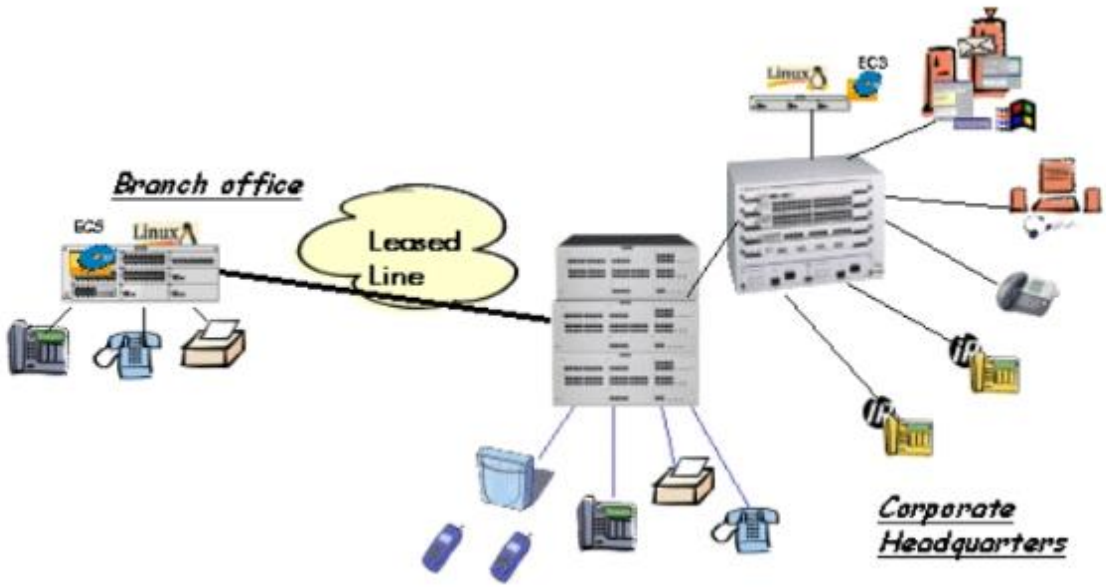
The numbering plan can be homogeneous or heterogeneous.

If the ABC-F (Features), ABC-M (Management) and Virtual Services are carried by an ABC link, only ABC-F is carried by an ABC-F Trunk-Group. So, in a supra network, homogeneous networks are managed independently and the applications (e.g., Voice Mail) are centralized at the level of each homogeneous network.

In a supra-network, each homogeneous network retains its own external connections and attendants. Therefore, one of the advantages of this configuration is that a large company with an international scope can have an enterprise-wide network while maintaining local connectivity to the PSTN.



3.1.2 Private ABC networks using TDM leased lines



Systems can be interconnected using:

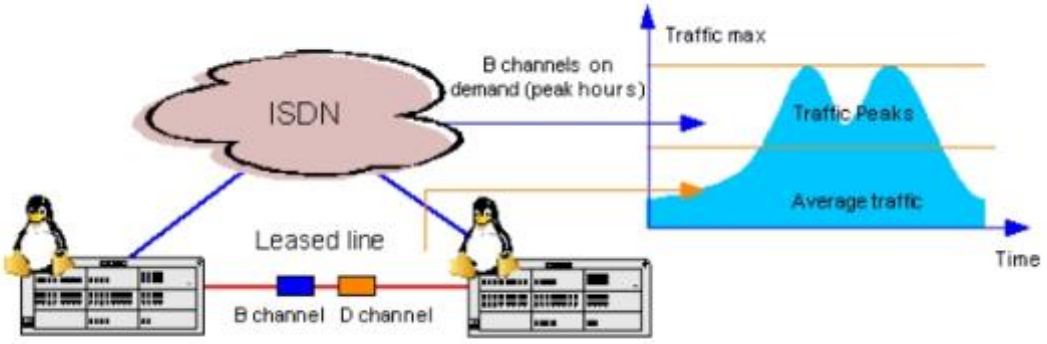
- G.703/G.704 T1/E1 leased lines. ABC signaling is transported using TS16. Voice is transported in remaining digital frames
- Systems can be interconnected using several T1/E1 interfaces or a part of a single T1/E1 (fractional T1/E1). It is also possible to provide ABC-VPN over leased lines. If the leased line is saturated, additional calls are routed over the public network (providing that the user has the correct class of service)

Note: ABC networking over analog leased lines is also supported. In this case, the Crystal media gateway is used to provide the tie line interfaces required (ACEM, EMTL boards).

3.1.3 ABC virtual private networks (VPNs) on ISDN/PSTN networks

ABC VPN and leased lines

Cost restrictions related to private network designs often lead to bandwidth limitations. However, to provide maximum availability, private links must be sized to support peaks in network traffic. This results in some bandwidth being unused for long periods of time, and it increases monthly lease expenses. The best way to optimize bandwidth is to reduce the number of leased lines based on average traffic requirements and overflow traffic during peak traffic periods to an alternative network, as illustrated below:



Service characteristics

The ALE International VPN configuration offers full ABC services regardless of the network used for voice transport. Telephone signaling always uses a reserved channel in the digital leased line (D channel).

The application uses virtual direct inward dialing (DID) to overflow calls when the leased line is saturated. A limited set of DID numbers are reserved for this service (according to the traffic), so as to integrate users with or without DID numbers into the network while saving DID subscription costs.

The network manager can precisely configure overflows. The service can be assigned user-by-user, so that the cost remains under control, while guaranteeing a good quality of service.

When the leased lines are saturated, a voice guide suggests an automatic callback request to a user who is not entitled to an overflow operation.

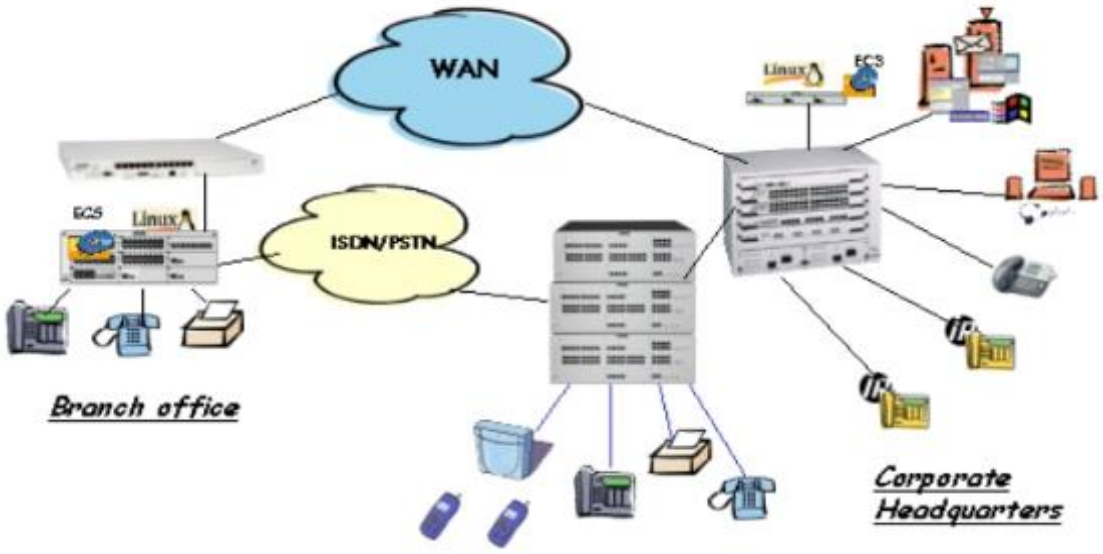
In addition, a flag is associated with each overflowed call in the OmniPCX Enterprise Communication Server metering (accounting) application. This gives the network manager precise data to analyze to ensure the service remains consistent over a period of time.

ABC VPN without leased line for voice

For some configurations with low traffic levels, a dedicated digital T1/E1 line is not cost effective. Today, many enterprises have switched from owned leased line networks to managed-switched voice networks (voice VPN).

For such topologies, the OmniPCX Enterprise Communication Server interconnects systems with full ABC services using the PSTN to support ISDN services, or a private QSIG network to transport voice and a permanent line to transport signaling, as shown below.

IP network:

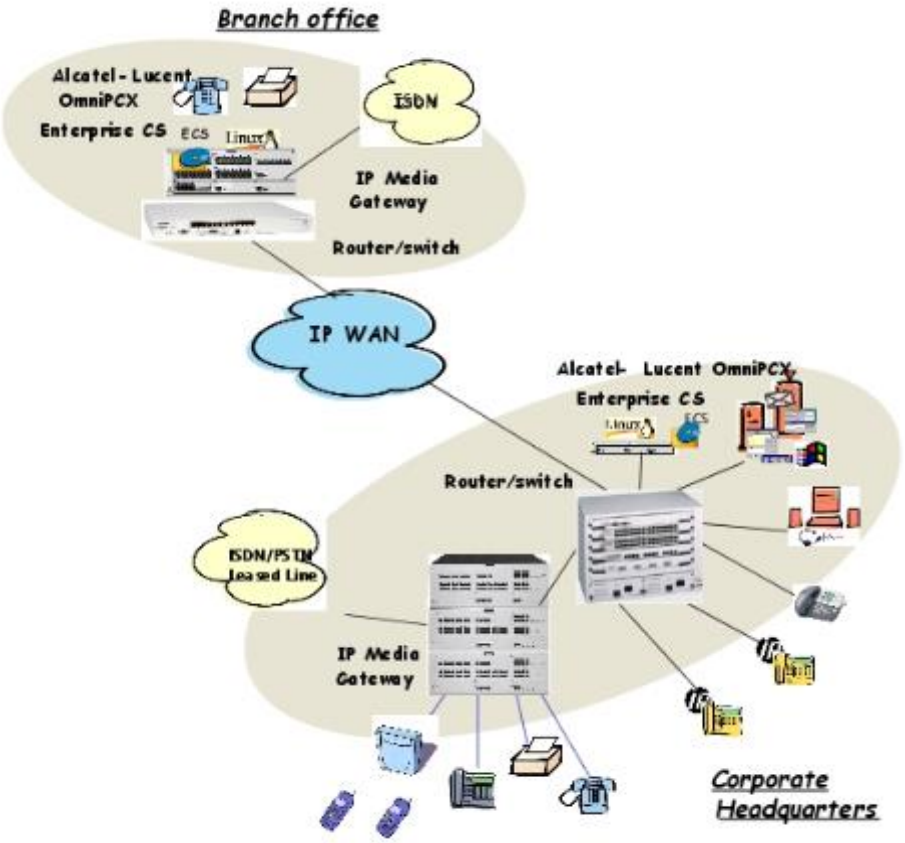


Service characteristics

The ALE International VPN configuration offers full ABC services. The service uses virtual DID. A limited set of DID numbers is reserved (according to the traffic requirements) so the application can integrate users with or without DID numbers into the network while saving DID trunk expenses.

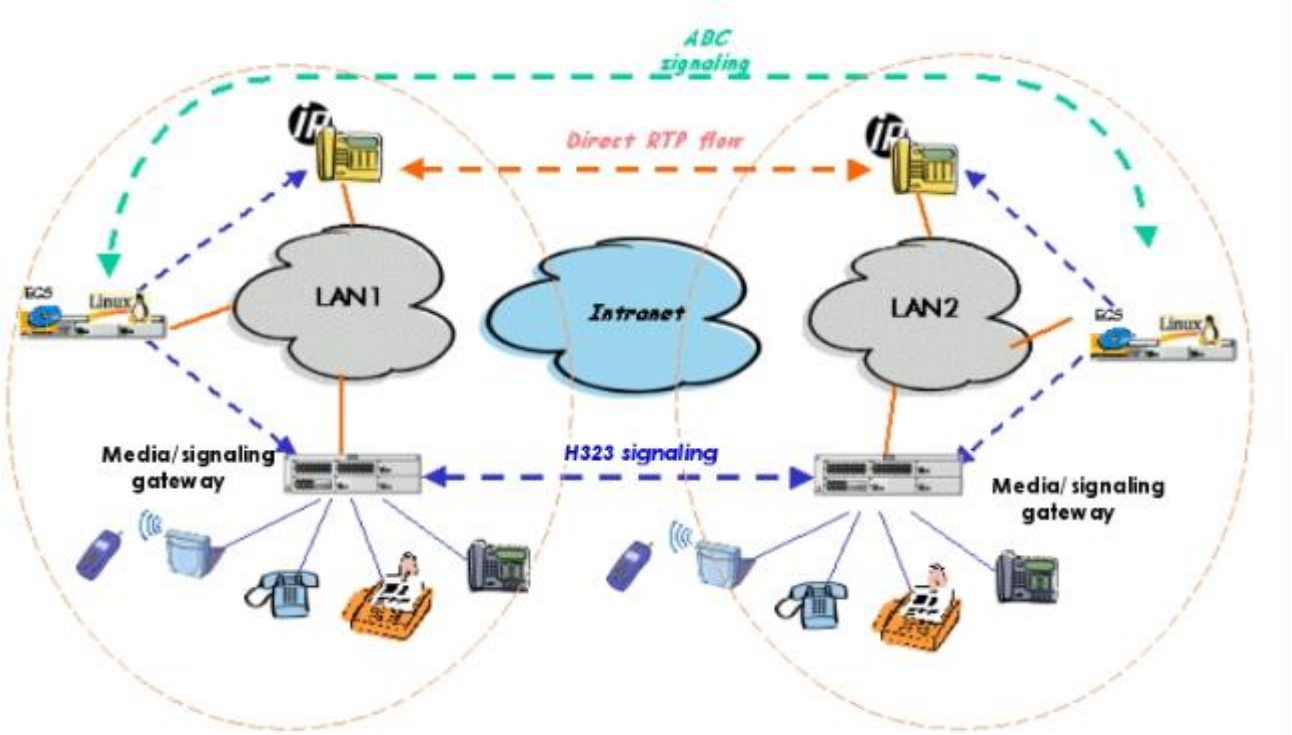
3.1.4 VoIP networking in ABC networks

The OmniPCX Enterprise Communication Server provides full feature transparency via leased lines and ISDN/PSTN networks. It provides the same transparent features when different OmniPCX Enterprise Communication Server systems in a private network are interconnected through an IP network.



The H.323 gateways and ABC building blocks provide:

- Standard VoIP (H.323): G.711, G.723.1 and G.729A voice codecs and fax
- A high level of feature transparency (ABC protocol)
- Direct RTP between IP phones and distributed media gateways on different nodes to minimize delay (no transit in the network)
- Ability for calls to overflow transparently to the ISDN/PSTN network when the IP WAN is out of service or if IP trunks are saturated (see Call Admission Control chapter)



Call admission control on H.323 VoIP networks using internal mechanisms

CAC (call admission control) is used to prevent a new call from being routed over the IP network if there is not enough available bandwidth. The call is rejected or is rerouted through the PSTN with complete feature transparency.

Due to the characteristics of IP, it is not possible to dynamically adapt to the available bandwidth on the network. However, the OmniPCX Enterprise Communication Server performs CAC statically in two ways in an ABC network:

- Globally limiting the number of H.323/ABC calls on a node (e.g., if fixing a maximum of ten incoming/outgoing calls, the eleventh call will be rejected)
- This solution is well adapted to IP networks with a star topology (a single WAN link per node)
- Limiting calls per direction when the site has several WAN links to other sites. For example, ten calls in direction one, five calls in direction two, etc.

  This solution is well adapted to IP networks with a meshed topology.

Call admission control for SIP

CAC is used to manage the traffic for SIP phones in the same way as IP Touch phones or IP Media Gateways as the SIP endpoints are registered in the OmniPCX Enterprise Communication Server SIP Proxy.

A SIP phone making or receiving an intra-domain call will use the intra domain codec for the domain, typically G711.

If the maximum number of domain calls is reached, the SIP phone will be forced to use the pre-defined extra domain codec.

The CAC-SIP configuration (y/n) limits the number of SIP calls by domain to maintain voice quality.

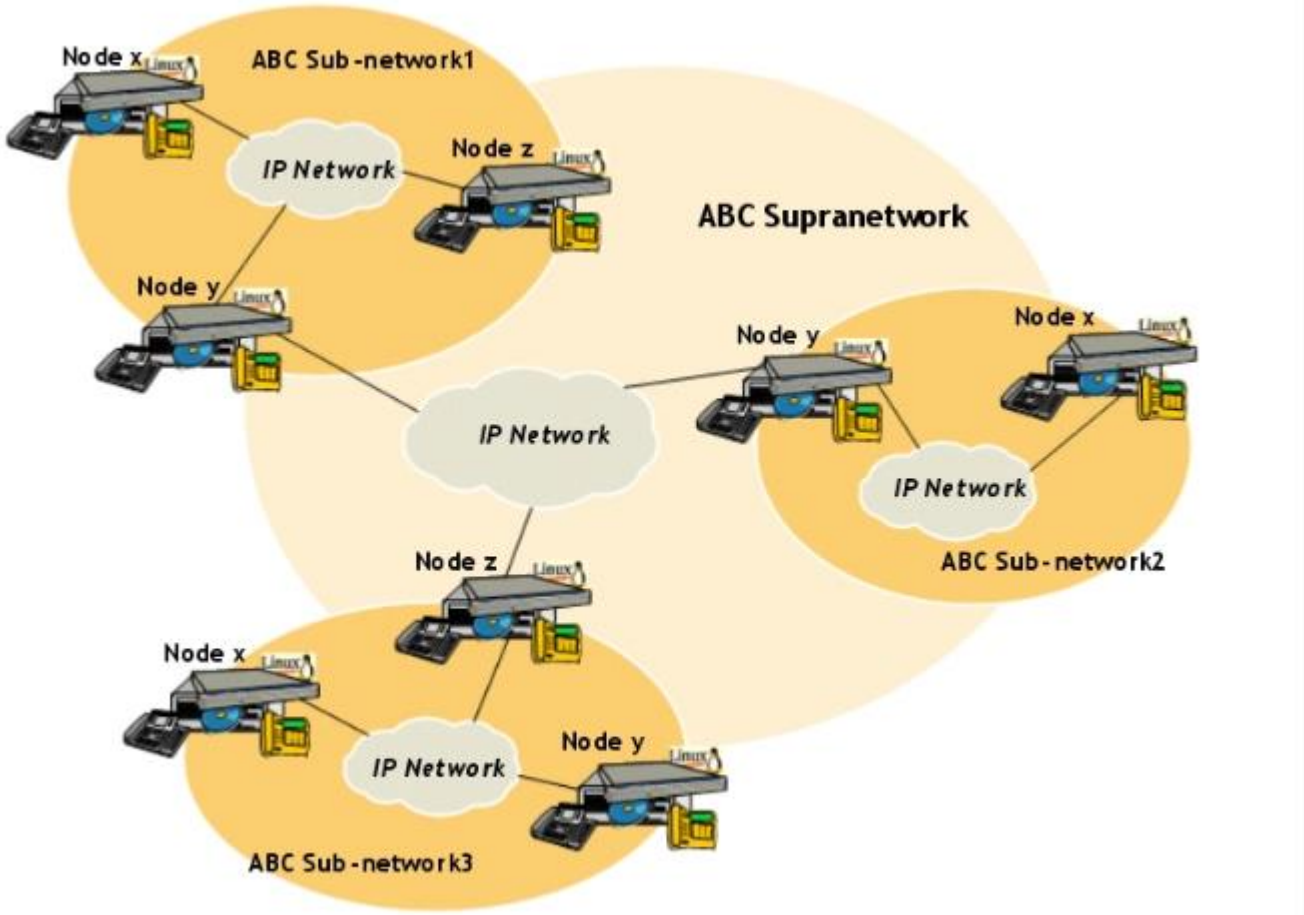
Note: Video is not possible if CAC-SIP is enabled.

3.1.5 Private ABC sub-networks using ABC trunk groups on IP

The ABC trunk groups on IP provide an alternative to the TDM leased lines to connect ABC sub-networks within a network consisting of ABC sub-networks (i.e. an ABC supranetwork).

The ABC trunk groups on IP enable a fully-fledged IP solution for communications within an ABC supranetwork. Within ABC sub-networks, the inter-node IP links are provided by ABC logical links on IP.

Via these IP links, the ABC supranetwork forms a global IP network where IP communications are ensured from their beginning to their end within the ABC supranetwork.



Within an ABC supranetwork, up to 250 ABC sub-networks can be connected via ABC trunk groups on IP.

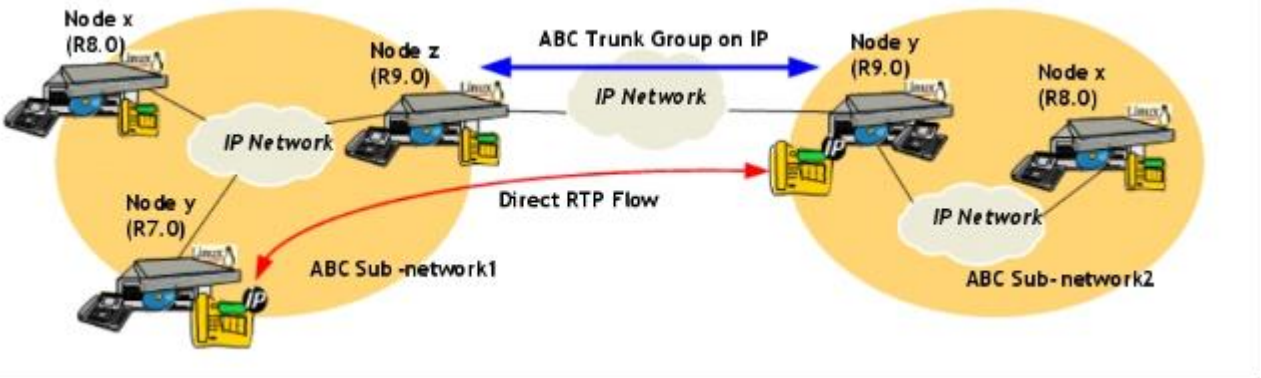
- When there are too many Communication Servers in an ABC sub-network (OmniPCX Enterprise product limit)
- For customer deployment and organization (per area)
- For numbering plan issues (within an ABC sub-network, the numbering plan must be homogeneous)

Services provided by the ABC trunk groups on IP are:

- Same level of services as TDM leased lines
- Direct RTP between IP devices located on different ABC sub-networks
- Call Admission Control (CAC) over IP
- IP Touch Security service (encryption)
- T.38 fax communications over IP

- Possibility to configure heterogeneous numbering plan in the ABC supranetwork
- Compatibility with current network services of the OmniPCX Enterprise Communication Server (e.g. Automatic Route Selection)

An ABC-F Trunk Group on IP can only be configured between two nodes (of different ABC sub-networks) in R9.0 or higher. An ABC sub-network can contain nodes in releases lower than R9.0 (this depends on the Alcatel-Lucent compatibility between releases).



Use of ABC trunk groups on IP implies the following restrictions:

- Both ABC trunk groups on IP and TDM leased lines cannot be supported at the same time between two ABC sub-networks
- Only one ABC trunk group is supported between two nodes located on different ABC sub-networks

3.2 ABC network features

Distributed call handling is available for enterprises with multiple sites.

Each site is equipped with a specific Communication Server E-CS (which may be duplicated), using the same basic software as typical single-site configurations (classic or IP configured).

The servers are interconnected to provide the customer with all the expected benefits of networking (cost optimization, centralized resources, transparent service for the end user, centralized management, etc.)

These services are supported by the enhanced ABC (Alcatel-Lucent Business Communications) protocol, which is compatible with the QSIG-GF standard.

The ABC protocol has four main modules:

- ABC-F for feature transparency - provides users with the same telephone services regardless of their location in the enterprise.
- ABC-M for network wide management - allows centralized, simplified management
- ABC-R for network wide routing - optimizes routing for cost/resource optimization and simplifies routing management
- Virtual services which carry the ABC-A (Application) protocol which allows the centralization of applications (e.g. voice mail centralization) but also specific information relating to the call distribution or multi-line feature (there can be managers located in one node and their assistant located on another node, a phone connected on a node may be supervised from a phone connected on another one, etc.)

Because of its support for QSIG-BC and GF protocols, OmniPCX Enterprise Communication Server inter-PBX networking interoperates with third party QSIG devices and/or PBXs.

3.2.1 Private numbering (dialing) plan in an ABC network

The private numbering (dialing) plan is homogeneous. Directory numbers can have up to eight digits in an ABC homogeneous network (each number is unique in the network).

In a network of homogeneous ABC networks (supranetwork) or a QSIG network, the private numbering (dialing) plan can be heterogeneous (between homogeneous networks) and can support up to 20 digits.

Moving a user in an ABC homogeneous network

A user who moves from one node to another can keep the same phone number (number portability). This is particularly important in campus networks where users often move but want to keep their telephone numbers.

3.2.2 Network-wide telephone features

The OmniPCX Enterprise Communication Server provides the following network-wide features:

- Basic call
- Number and name identification
- Call/dial by name
- Call waiting indication
- Call offer
- Callback on busy links
- Callback on free or busy extensions
- Call park
- Call forwarding
- Camp on
- Individual call pick-up
- Data call
- Distinctive ringing
- Hold
- Intercom call
- Consultation call
- Broker call
- Transfer
- Conference
- Intrusion/Barge-in
- Unconditional call forwarding
- Conditional call forwarding
- Substitution (partial)
- Do not disturb
- DISA
- Text mini-messaging
- Transparency of rotary and DTMF dialing
- Retransmission of last number dialed (redial)
- ISDN/PSTN supplementary services
- Three-party conference
- Six-party casual conference
- 29-party meet me conference
- 29-party moderated (master) conference
- Announcement/paging on speaker

3.2.3 User group features

User group features including busy lamp field (BLF) supervision and DSS (direct station selection) are also available network wide:

- Associate in network
- Immediate call forwarding to associate
- Conditional call forwarding to associate
- Manager/assistant filtering/screening team
- Object supervision: free, partially busy, totally busy, ringing
- Hunting groups

3.2.4 Mobility features

Mobility features of the OmniPCX Enterprise Communication Server include:

- WLAN
- DECT mobility in network: roaming, user rights, and accounting assigned to home node number

For a DECT wireless handset, roaming is the ability to be located and called anywhere within the area covered by the base stations. When several OmniPCX Enterprise Communication Server systems are in a private network, the mobile phones must be registered with the "roaming in network" capability, allowing them to be used within the radio coverage area of any OmniPCX Enterprise Communication Server in the network. The users at the guest node have the same access rights as when located on their home node because of the transparent transmission of class of service and call detail records (for accounting purposes). Roaming also allows voice mail message notification, screening, etc.

- Paging services in network
- Remote call forwarding
- Substitution
- Ubiquity services

3.2.5 Centralized or distributed attendants

Attendants can be centralized or distributed over an ABC network and have access to the following features:

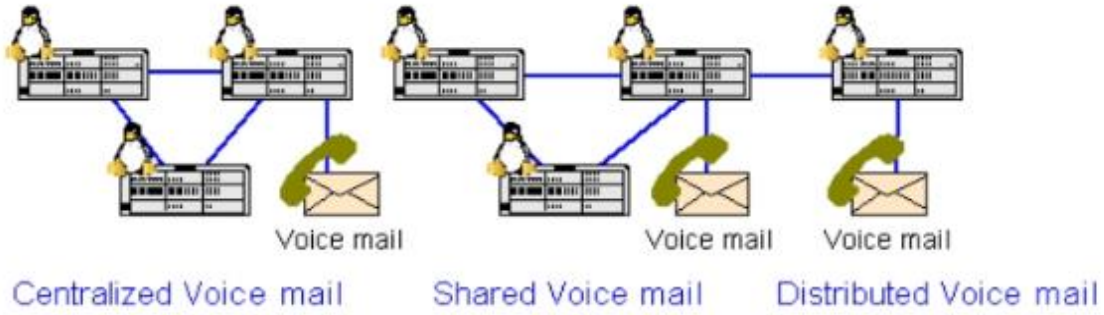
- Basic call
- Number and name identification
- Three-party conferences
- Broker call
- Call by name
- Call distribution for decentralized and centralized attendants
- Call offer
- Chained call
- Class of service identification
- Class of traffic indication on line keys (internal call, external call, overflow)
- Do not disturb override
- Dynamic accesses to user call resources (DECT, voice mail, text mail, etc.)
- Consultation call
- Call hold
- Intrusion/Barge-in
- Large busy lamp field supervision
- Multi-tenant services
- Overflow of unanswered external calls
- Retransmission of last number dialed (redial)
- Routing and services for multi-company multi-department services

- Station reservation
- Text advertising message on busy user display
- Text mini-messaging (Short Message Services)
- Traffic overflow for attendant group or attendants based on caller waiting time
- Transfer with or without presentation
- Transparency in decadic (rotary) and Q.23 (touchtone) dialing
- Trunk allocation with or without outgoing call restriction

3.2.6 Centralized, distributed, or shared voice messaging systems

The voice mail architecture can adopt different configurations:

- The service can be centralized for the entire network (i.e., a single voice mail system can support multiple networked OmniPCX Enterprise Communication Server systems). This service is available using the:
  - A4645 Voice Messaging System
  - OpenTouch Message Center
  - OpenTouch Multimedia Services voice messaging
- Multiple voice mail systems (with a maximum 127 external voice mails) can be configured within the network, each shared by a group of OmniPCX Enterprise Communication Server platforms using the:
  - A4645 Voice Messaging System. It is possible to network several A4645 VMS through VPIM
  - OpenTouch Message Center



Regardless of the configuration, to users and network managers, voice mail services are the same as for a single voice mail system.

Note: See the chapter on messaging systems for more details.

The OmniTouch Unified Communications system is available. See the specific documentation for details on multi-site environments.

3.2.7 Distributed contact center

The distributed OmniPCX Enterprise Communication Server CCD (contact center distribution) capabilities are layered above OmniPCX Enterprise Communication Server networking features and therefore are supported in virtually any ABC network configuration. The OmniPCX Enterprise Communication Server CCD offers two powerful built-in mechanisms for multi-site processing:

- Cooperation between resources situated at different locations. These cooperative facilities offer call routing options for situations in which the service level cannot be guaranteed locally
- Virtual call distribution using the virtual contact center concept, where call-by-call distribution is made to the most appropriate resource regardless of its location

Note: See the Customer services chapter for details about applications in a multi-site environment (including CCx software suite, web softphones, etc.)

3.2.8 Adaptive routing

On TDM leased lines

Adaptive routing is a powerful routing application that manages call routing in an OmniPCX Enterprise Communication Server ABC network based on TDM leased lines (T2 or T1 or T0). Adaptive routing is a routing mechanism where the route is calculated before the call is set up. Call setup includes the route to follow, thus avoiding routing in transit nodes.

Each Communication Server integrates the exact topology of the private network at all times and can determine in real time the current route availability and traffic load. The Communication Server immediately selects the best available route based on the load on each link and the number of hops required (transit PBXs) for completing the call.

Adaptive routing provides a high level of security (avoids loops) and link optimization, and avoids performing routing management in the private network.

With adaptive routing, the private numbering (dialing) plan can be distributed throughout the network without requiring any additional management task, (e.g., directory number 56000 on node 1, 56001 on node 2, 56002 on node 1, 56003 on node 4, etc.)

Adaptive routing in ABC-VPN networks (over switched networks)

Adaptive routing on switched networks is different than on fixed leased lines.

The private voice topology through the PSTN network can be "logically" defined by creating "VPN jumps" to link the different nodes to form a fully meshed or partially meshed topology.

Each VPN jump has an associated "cost."

Before a private network call is set up, the routing service selects the best route, which is the route with the computed lowest cost.

3.2.9 Alternate route selection (ARS)

Alternate route selection, sometimes referred to as Least Cost Routing (LCR), is used when a user of an OmniPCX Enterprise Communication Server system dials an external number (not internal, not private ABC), for example, a public call or private call (tie lines, etc.).

ARS allows the communication server to select trunk groups and modify dialed digits based on a set of parameters such as dialed number, entity of the caller, or time of day.

ARS is used in a standalone or networked configuration for optimizing external telecom call costs.

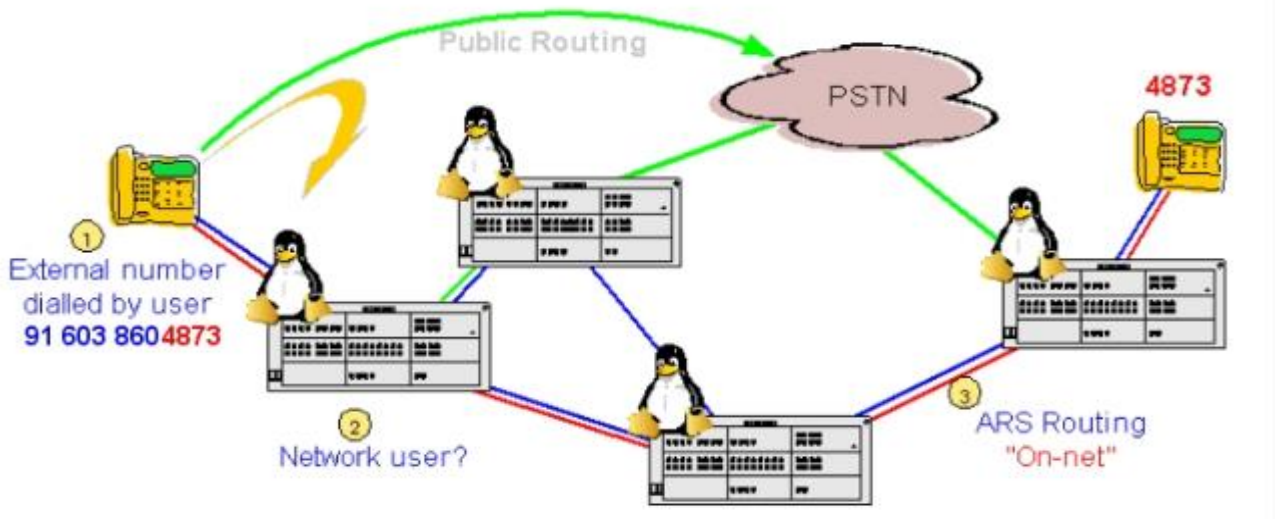
- Direct or indirect multi-carrier access (stand alone, network)
- Forced on net (network)
- Break out (network)

ARS services are transparent to network users. The main characteristics of ARS are:

- 20,000 plus routes (not limited)
- 4,000 route lists
- One to 30 digit numbers analyzed, with management of exceptions
- Number translation (add or delete)
- Overflow to ten different carriers
- Overflow to other carriers according to user's class of service
- Informative voice prompt if user overflows to an expensive route
- Informative voice prompt if least cost route is unavailable
- ARS is time dependent based on:
  - Day of week: 100 weekly tables
  - Hour and minute of the day: five daily tables per weekly table
  - 24 periods per day

Forced on-net routing

The ARS/LCR application built into the OmniPCX Enterprise Communication Server analyzes the public number dialed before setting up the call (ARS prefix). If the called party belongs to the private network, the ARS application will automatically choose the least costly route (in this case, a private route) and provide ABC feature transparency.



Break out (hop off routing)

When a user calls an external party, the number dialed is analyzed by the ARS/LCR application. Each OmniPCX Enterprise Communication Server integrates the exact topology of the private network at all times and can determine in real time the current route availability and traffic load (information via the D-channel signaling). The OmniPCX Enterprise Communication Server transparently selects a route over private infrastructures to make an external call using the PSTN line with the lowest cost.

Multiple carrier selection

When a user calls an external party, the number dialed is analyzed by the ARS application. According to the call direction, the best-priced carrier is selected.

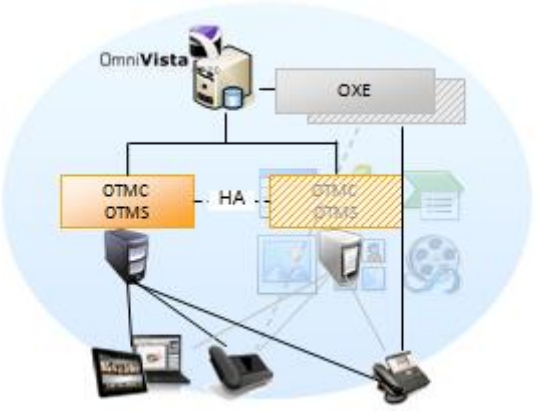
The address information is modified to conform to the carrier's numbering scheme (by adding, removing, or converting digits), and the called number and converted number are stored in the call detail record application.

When the lowest priced carrier for this call is not available (congested), the caller, if so entitled, is diverted to another carrier offering a higher cost. The user is informed of a route change by a voice message. They can hang up and try again later if the call is not urgent, or wait for the call to overflow. At the end of the waiting queue, the call is diverted to the second carrier with the number converted automatically as described above. The ARS application allows ten different carriers to be selected successively.

3.2.10 Management of an ABC network

The ABC management tools are based on PC clients based on a server using Windows OS. They provide a complete set of graphical user interface applications designed to facilitate day-to-day management operations. The management workstations are connected through an Ethernet link to a networked Communication Server. Dialog between the management workstation and the OmniPCX Enterprise Communication Server is based on standard protocols: FTP, CMIP/CMISE... SNMP is integrated in order to allow network supervision with other company management tools.

Network management can be centralized or distributed.



Configuration broadcast mechanism

The management workstation can manage one, several, or all the nodes in a private OmniPCX Enterprise Communication Server network. This mechanism does not use any bandwidth on the B channels of the ABC links; only the signaling channel (D channel) is used. A network manager can program or modify any system, station user, or voice mail system parameter from one unique PC client window. The other network nodes and the centralized directory are immediately and automatically informed, and their databases are updated with consistent information.

Audit service

Another management service is the audit service. This service has been designed to facilitate consistent network monitoring, reconfiguration, and evolution and to easily integrate voice mail. After a local configuration change, a new node automatically retrieves the network configuration and updates its database (network translator, phone book, etc.) while the voice mail updates the user database.

Voice mail management

Only one workstation management operation is needed from the administrative station's user management window to configure a user (on any network node) and assign voice mail services (mailbox and user profile). The voice mail system automatically creates a virtual user mailbox in the other network's voice mail system. Each user can then create distribution lists and transfer messages, etc., to the other users in the network as though they were on the same node.

Management: SNMP support on OmniPCX Enterprise Communication Server

The management of the OmniPCX Enterprise Communication Server can be integrated with standard network management platforms such as HP OpenView NNM (HP) using Simple Network Management Protocol (SNMP). These network management platforms are referred to as hypervisors.

Hypervisor Integration is a solution to manage converged voice and data enterprise networks. It is particularly well suited for networks with elements from multiple vendors.

Hypervisor integration provides two main features:

- Control of the Global Network: This is a standard, joint offer from the hypervisor provider and ALE International. Customers will use the standard hypervisor (UNICENTER, HPOV, Tivoli, etc.) with only those customizations available through the standard hypervisor capabilities. Control of the global network is provided via an overview of the network (i.e., topology map)
- Topology views may cover every network element and application. Alarm status is indicated by a change in the color of the associated icon. In depth analysis of the alarm status may be conducted, either by using the hypervisor event manager, or by using the proprietary tools designed by the network item provider. Hypervisors do not provide configuration capabilities because this is specifically linked to each network item.
- Specific Alarm Handling: This is a customized solution specifically defined by the customer. The customer will handle all the global network alarms with specific tools created for their help desk organization. This usually requires in-house development by the customer.

Functional options and how they work on the OmniPCX Enterprise Communication Server

Functionalities vary for each hypervisor. They depend on the generic capabilities of the hypervisor and on the capabilities of the hypervisor agent that are developed by ALE International, partners, or the customer.

Auto-discovery and Topology

The hypervisor uses ping and SNMP Get commands to discover IP components. The hypervisor replies to SNMP Get commands with Alcatel-Lucent -specific object IDs or specific extended attributes allowing for the discovery of Alcatel-Lucent IP components and represented by Alcatel-Lucent specific icons on the topology map.

Hypervisors may poll IP components to get their status and display the related icons with their related colors.

The status of IP components may be obtained by the hypervisor based on answer (green)/no answer (red) or more precisely by using the ALE International -proprietary status attribute (there is no standard status attribute defined in MIB II) or status trap. MIB extensions and hypervisor agent development are required to handle the extended status attribute or status trap functions.

Alarm Handling

Alarms are sent by IP components using SNMP traps. ALE International uses a specific SNMP trap (defined in the SNMP standard) that allows equipment providers to create proprietary alarm traps to notify the hypervisor of alarms.

Security

The customer can define communities. SNMP requests can be done only between hypervisor and OmniPCXs belonging to the same community. The members of one community share the same community name. The community name is sent with each SNMP message and acts as a clear text password. SNMP requests with an unknown community name are rejected. The new SNMPv3:

- Restricts access of MIB information to authenticated hypervisors only. A hypervisor requires a SNMPv3 account (login name and password) declared in the Communication Server configuration. The hypervisor agent, which carries out specific functions (e.g. security), must also be declared. A maximum of 10 SNMPv3 user accounts can be configured on the hypervisor agent
- Provides an encryption process for SNMP Protocol Data Units (PDUs). PDUs can contain address and control information. To cipher the PDUs, a hypervisor must declare a SNMPv3 passphrase in the CS configuration and in the hypervisor agent configuration.

3.2.11 Business continuity in case of Communication Server switch-over

Network established ongoing communications are maintained, even if an IP/ABC Link or hybrid TDM Link is involved in the communication. Thus, business continuity is offered between endpoints (IP Touch, legacy devices/ trunks, SIP devices/trunks, soft clients for OpenTouch users, equipment connected to another Communication Server, through ABC/IP Trunk Group or ABC TDM Links) belonging to different Communication Servers.

- Peer-to-peer communications in conversation state are maintained
- In set-up phase, communications are released except for incoming external communications, which are routed to the relevant entity (e.g. an attendant)
- Conferences are not maintained and communication on hold will be either distributed in function of entity (for external communication) or released
- Communications involving attendant, automated attendant, IVR, voice mail, nomadic are released

The evolution of the communication (from calling party or called party) is not handled during the switch-over (except for hanging up, press the release key, hands-free/ handset switch-over, mute activation/deactivation, level of loudspeaker management). However, at the end of switch-over (new established link between the two Communication Servers), the communication can evolve as before.

For IP and hybrid links, the network communication cannot evolve during the switch-over (40-60 seconds.). Nevertheless, users can:

- Alternate between hands-free / handset
- Mute/ un-mute
- Modify the loudspeaker level
- Release the call (hang-up, press the release key)

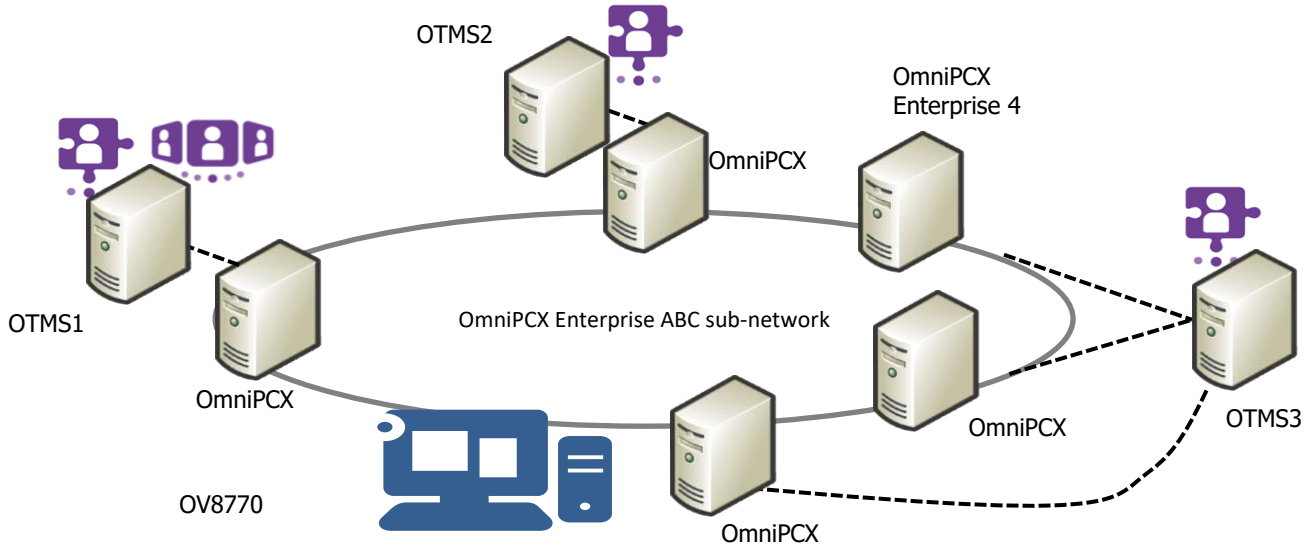
The devices are not reachable and are seen out of service during switch-over.

This feature does not require additional new fees and it is compatible with:

- IP Touch Security deployment
- Communication Server spatial redundancy

3.2.12 Multi-OpenTouch deployment in ABC network

Multi-OT instance deployment is possible to address large configuration in terms of users and/or to address multi-site design with autonomous systems for Telephony & Unified Communication Services.



Up to 20 OmniPCX Enterprise /OTMS

- Within an ABC sub-network (up to 100 nodes)
- Up to one OTMS instance per OmniPCX Enterprise system and up to 20 OmniPCX Enterprise per OTMS
- Only One OTMS
- Up to 5K users per OTMS instance

Unified centralized management (OV 8770)

Functional perimeter:

- OmniPCX Enterprise interconnections to deliver telephony services between OpenTouch users
  - ABC level of services
  - Level of telephony services between OT users:
  - Same as standalone (P2P com. w/ name id., transfer, routing, call back, …)
  - Applicative services
  - Universal Directory Access
  - Scheduled Conferencing/Collaboration (IM, doc sharing) services, multi- system based
  - Dedicated Voice Messaging Services on each OT instance
  - API framework for each OT instance
  - Remote Favorites w/o presence, ID picture
  - Local Attendant services
  - Other services (IM/Presence federation, video …) not available

3.3 Heterogeneous networking

3.3.1 ISVPN (country dependent)

ISDN based VPN (ISVPN) provides an entry level networking solution based on a subset of the ABC private network protocol using only the ISDN network.

No leased line is required for voice or telephone signaling. Voice is transported over the standard public ISDN network, and the signaling transport is based on the USS1 service provided by the ISDN network. The features provided by this service are:

- Distribution of incoming public calls based on virtual DID
- Homogeneous private numbering (dialing) plan
- An ISVPN call is seen as an internal call, not a public call
- Name identification (with transport of number)
- Optimized transfer (loop avoidance and optimized call forwarding)
- Callback request (on 8/9 series)
- Intrusion/Barge-in
- Other OmniPCX Enterprise Communication Server features over ISDN without the added value of ISVPN
- Call distribution in network: centralized attendants
- Inter-working with ABC networks
- Centralized management

ISVPN is also supported on the OmniPCX Office, which is used to build small, simple enterprise/office networks over ISDN.

3.3.2 DPNSS networking

The OmniPCX Enterprise Communication Server offers a compliant legacy Digital Private Network Signaling System (DPNSS) interface and protocol, mainly used to connect the voice system to:

- DPNSS installed base not compatible with QSIG
- VPN offer of BT (FEATURENET) and Cable & Wireless in UK
- Alternative carriers (e.g., GSM operators in Germany and Sweden)
- Legacy applications

The DPNSS services supported are:

- Voice call (six and seven)
- Callback when free (call completion on busy phone) (nine)
- Intrusion/Barge-in (ten)
- Call forwarding (11)
- Hold (12)
- Inquiry/consultation call (13)
- Transfer (13)
- Conference (13)
- Call offer (14)
- Service independent string (16) name
- Call waiting (17)
- Route optimization (19)
- Centralized night service (25)
- Do not disturb (32)

3.3.3 QSIG

The QSIG protocol provides a very good method for connecting PBXs from multiple vendors. QSIG is an open, international standard supported by the world's leading PBX suppliers. The QSIG protocol is based on ISDN and ensures service compatibility between public and private ISDN networks. QSIG can work in all kinds of topologies, with no limitation on the number of nodes supported and no restrictions on the numbering (dialing) plan.

The OmniPCX Enterprise Communication Server offers a network interface implementing QSIG-BC (QSIG basic call). QSIG BC (ETS 300 172) is the part of the protocol that describes the basic call and

extends the public ISDN access protocol for use in private basic rate access and primary rate access services. As one of the QSIG Forum founders, ALE International supports this standard and is committed to implementing enhancements as the OSI committee makes them standards.

QSIG numbering (dialing) plan

The following numbering plans are supported:

- Heterogeneous numbering plan
- Closed numbering plan
- Open numbering plan (up to 20 digits)

QSIG-BC services

The level of service of QSIG-BC (basic call) is the same as on traditional tie lines with the following advantages:

- Caller and connected party number identification
- Voice call

Accounting

Each outgoing call on the QSIG trunk generates a Call Detail Record (CDR) with the duration of the call.

Interaction between the different systems

An OmniPCX Enterprise Communication Server user can make a call on a public trunk line located on another PBX through the QSIG-BC interface. In this case, the OmniPCX Enterprise Communication Server performs external call restriction. In addition, for all incoming QSIG-BC calls, if the party's class of service is sent by the connected PBX, the OmniPCX Enterprise Communication Server is able to differentiate calls originating from private subscribers and public trunks, and react as follows:

- Calls originating from private networks are treated as internal calls in attendant queues
- Public calls are stored in the unanswered call directory
- For calls coming from the public network through QSIG-BC, a call overflow on no answer or busy user can be processed either by the OmniPCX Enterprise Communication Server or in the transit network, depending on configuration

QSIG - GF/SS

GF (generic function) and SS (supplementary services) are the service enhancements of QSIG-BC. Additional services have been defined as part of the new standard. Those standards, as soon as they are available, are implemented in the OmniPCX Enterprise Communication Server proprietary network protocol.

The QSIG-GF provides name identification plus transparent features. QSIG-SS provides telephone services such as:

- Calling line identification presentation
- Connected line identification presentation
- Calling/connected line identification restriction
- Calling name identification presentation
- Connected name identification presentation
- Calling/connected name identification restriction
- Generic functional procedures
- Call forwarding - unconditional
- Call forwarding - busy
- Call forwarding on no answer
- Call transfer
- Path replacement
- Call completion to busy subscriber

- Call completion on no answer
- Call offer
- Advice of charge
- Call intrusion (Barge-in)
- Do not disturb
- Message waiting indication (when the messaging system is the A4635 or A4645)

3.3.4 SIP interoperability

The OmniPCX Enterprise Communication Server and the OmniPCX Office Communication Server are fully compatible with SIP.

See the chapter on SIP for more information.

3.3.5 OmniMobility voice over wireless LAN

3.3.5.1 WLAN infrastructure

In many business environments, mobility is an ever increasing priority, but the ways in which end-users communicate evolve constantly. Within company premises, end-users get accustomed to comfortable and efficient methods to ensure voice and data communication exchanges. Away from the desks, but still at work, they are entitled to expect the same facilities and services.

ALE International, the leader in wireless voice solutions for the workplace, offers the industry's most advanced Voice over IP (VoIP) service for Wireless LAN (WLAN) networks, namely VoWLAN (Voice over Wireless LAN) or VoIP on WLAN.

To meet corporate user mobility requirements in company premises, ALE International provides a range of VoWLAN solutions for businesses in search of a scalable, secure WLAN network to deliver high performance user access, supporting location tracking applications.

Based on global standards for WLANs, ALE International VoWLAN solutions simplify network infrastructure by allowing converged voice and data traffic over a common wireless broadband (802.11a/b/g/n) network.

3.3.5.1.1 ALE International VoWLAN single infrastructure

The OmniAccess Wireless platform offers an evolutionary new architecture that delivers mobility, security and convergence for today's networks, leveraging a distributed wireless deployment with centralized control. The centralized architecture concentrates all intelligence in the WLAN controller for increased functionality, manageability and ease of deployment.

The ALE International VoWLAN infrastructure is around three aspects which can be mixed and matched to meet different challenges and customer requirements:

The OmniAccess WLAN controllers: act as wireless IP switches and provide the connection between the wired LAN and the OmniAccess WLAN Access Points. .

The family of WLAN controllers delivers a centralized wireless security and management architecture. ALE International offers the most comprehensive line of WLAN controllers that include modular and fixed form factor systems appropriately sized for the small branch office, medium regional headquarters, and large dense building or campus environments. Each system integrates sophisticated features, such as identity-based policy enforcement, ICSA certified firewall, VPN server, intrusion protection and RF management. Hardware-based wireless processing enables ALE International WLAN controllers to deliver industry-leading performance (multi-gigabit encrypted throughput) and scalability. A single system can connect users to an almost unlimited number of access points. Multiple controllers may be teamed to provide both controller redundancy and to increase the system's capacity while retaining a single point of management

The **OmniAccess WLAN Access Points (APs)**: operate with the OmniAccess WLAN switches to provide a high performance, centrally managed, wireless mobility solution for enterprises. They act as wireless (radio) interfaces for the mobile WLAN handsets.

The ALE International solution offers a wide range of access points to support a variety of 802.11n solutions while also supporting legacy 802.11a/b/g devices. APs are available with both single and dual-radios to support communications in the 2.4 GHz and/or 5 GHz spectrum. Single radio access points can provide 802.11a/n or 802.11b/g/n and may be software configured on a per AP basis. Dual-radio APs support concurrent 802.11a/b/g/n communications to provide the broadest support for WLAN users. All of the APs are thin APs that work in conjunction with OmniAccess WLAN controllers, which automatically manage the operation of each AP, including power/transmit levels and channel assignments. Network traffic is typically tunneled from the APs to WLAN controllers using remote APs. This provides security and makes the solution easy to deploy and modify without making major modifications to the wired LAN. ALE International offers both indoor and outdoor APs

Software – The base system offers a fully functional and manageable platform capable of a wide range of functionality. Systems are licensed and sized by the number of APs to be supported up to the hardware's maximum with LAP licenses. With only the base access point software the systems support the full functionality web management interface, master-local teaming to unify the management of multiple controllers through a single point of management, captive portal authentication, WEP, WPA, WPA2, 802.1x, certificate based authentication, rogue detection, mesh functionality and remote AP functionality with encrypted IPSec tunneling back to the controller just to mention a subset of the system's functionality.

PEFV – The Policy Enforcement Firewall / VPN software module enables the controller as a VPN concentrator for IPSec clients or tunnel connections to other controllers or hardware platforms. It will also enable firewall policies to be applied to the traffic reaching the controller via these tunnels. This license is controller wide and not determined by the quantity of supported APs.

PEFNG – The Policy Enforcement Firewall / Next Generation license enables the firewall policies to be applied to WLAN traffic or wired traffic received by the controller. This software also enables QoS and VoWLAN applications on the controller. PEFNG is licensed by AP and must match the number of LAP licenses applied to the controller.

XSC – The XSC or xSEC license enables the controller to encrypt user traffic with 256-bit AES encryption. All other encryption types are available in the base software. The XSC license is based on a per-session basis and must be sized at or above the maximum number of concurrent sessions on the controller.

RFP – The RF Protect software module includes advanced RF analysis to be performed from the APs and provides wireless intrusion detection and protection for a wide variety of known attacks and security vulnerabilities. The RFP license is based on the number of APs supported by the controller and must match the quantity of APs provisioned under the LAP license.

The last software option available is the OmniVista 3600 Air Manager. The OV-3600 can be used in conjunction with the OmniAccess WLAN platform to enhance the system's manageability or can work with a third party product to assist in system migration or to manage a heterogeneous wireless environment.

The OV-3600 is the only network management software to deliver a single, easy-to-use console that gives the entire IT staff full visibility and control over their wireless network and its users. Network engineers, helpdesk staff, IT managers and security analysts at more than 650 enterprises and large organizations use the OmniVista 3600 Air Manager technology (under the Airwave brand) to make their wireless networks supportable, reliable, and secure.

The OmniVista 3600 Air Manager supports wireless equipment from seventeen different vendors, including Alcatel-Lucent, Aruba Networks, Cisco, Symbol/Motorola, Trapeze, Meru, HP ProCurve, Nortel, Proxim, Foundry, Colubris, Tropos, 3com, Enterasys, Juniper, Lancom, and Avaya.

The ALE International WLAN solutions support up to 512 access points per Supervisor Card 3 and up to 2048 access points on a single WLAN switch chassis (with 4 supervisor card 3), centralized encryption for 802.11i, advanced intrusion detection and protection capabilities, and offer user-aware fully operational firewalls.

Key benefits

Reduced Wireless Operating Costs

- Lowers user support costs by giving the Help Desk effective diagnostic tools
- Helps IT extend the useful life of existing WLAN infrastructure
- Automates routine tasks like configuration, software updates, and compliance audits
- Provides reports to facilitate capacity planning and efficient technology upgrades

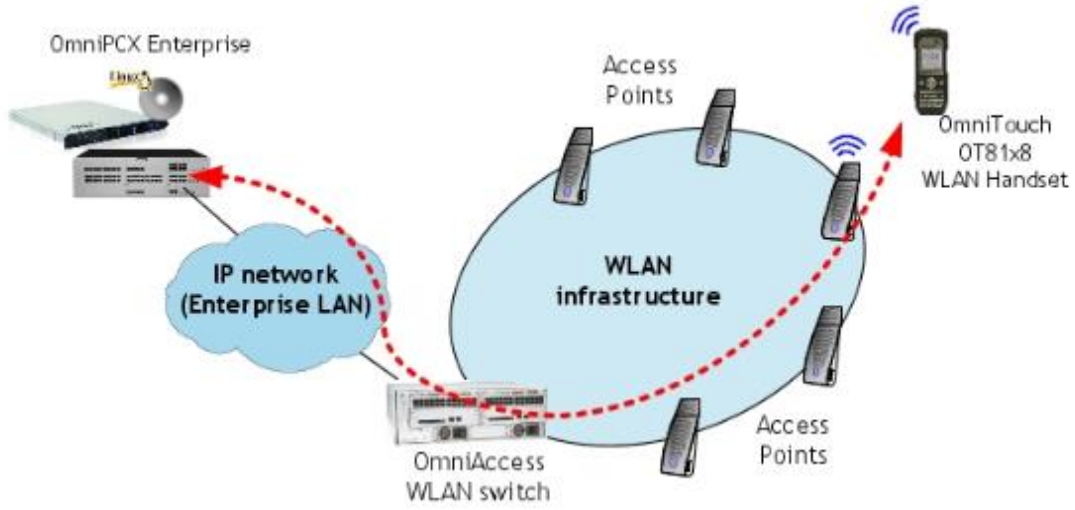
Improved Performance and Reliability

- Automates performance diagnostics and implements corrective actions
- Provides a complete reporting package that helps IT identify bottlenecks and problem areas
- Eliminates configuration errors that impact performance
- Enables rapid, remote problem resolution

Improved Network Security

- Enforces consistent configuration and security policies across the entire organization
- Detects unauthorized rogue access points
- Automates configuration compliance audits
- Provides role-based administrative access and complete audit logs • Allows IT to see every user on the network

To complete the VoWLAN offer, ALE International provides a line of professional WLAN handsets fully compatible with the OmniPCX Enterprise services.



Controlling access points

From a system capacity perspective, a single WLAN controller can connect tens of thousands of simultaneous users to thousands of access points. Because the OmniAccess 6000 is modular, it can easily scale to accommodate increased capacity. Simply adding a new Supervisor-III module can scale a platform to handle an additional 512 Access Points. The 6000 controller can support up to four Supervisor-III modules for a total of 2,048 APs. If the system needs to grow larger than this multiple controllers can be teamed to work together as a master-local grouping. In this case many controllers may work together as a cohesive system with a single point of management. Deployments

of over 1,000 APs will at times use a dedicated master controller which will support no AP connections but be dedicated to system management.

Load balancing

Access Point load balancing is available to intelligently allow the system to balance wireless traffic across adjacent APs. Load balancing can be triggered based on the number of users or degree of utilization on an AP. When traffic reaches the configured thresholds on an AP where load balancing is allowed, any new wireless client station attempting to associate with the saturated AP will be directed to an adjacent AP instead. Stations which are already associated with the AP are not affected.

For Alcatel-Lucent Access Points, load balancing is implemented by station management on the OmniAccess WLAN controller and is entirely standards based. This avoids any client driver changes to be made and allows the solution to operate transparently to end users. Bandwidth contracts can be used to constrain the bandwidth per user to help maintain acceptable network performance. Bandwidth is specified using a kbits|mbits parameter. The contract can be implemented so that all the users within the assigned role on a given AP share the bandwidth or per-user where each user in the role receives the entire bandwidth specified by the bandwidth contract.

Load-balancing is used to enhance the OmniAccess Wireless Call Admission Control (CAC) function by limiting the number of voice calls per AP. CAC follows voice signaling protocols allowing it to count the number of active calls per AP and trigger load-balancing.

3.3.5.1.2 ALE International VoWLAN product lines

The OmniAccess wireless product family is based on a centralized architecture with light access points, and embedded security.

One of the key challenges of mobility is security. The OmniAccess wireless product family embeds identity based security, WLAN intrusion prevention, endpoint integrity and content inspection services.

ALE International **VoWLAN products offer:**

A line of OmniAccess WLAN switches, namely:

OAW-4306G Used to support: • Up to 16 AP • Up to 64 RAP • Up to 512 users Equipped with two 10/100/1000 Gigabit Ethernet ports, four 10/100/1000 POE+ Gigabit Ethernet ports, two Gigabit SFP ports, four USB ports and one ExpressCard slot for flexible LAN applications. Embedded Stateful Inspection firewall options.	 **OAW-4306G**
OAW-4504XM, 4604 & 4704 Equipped with dual personality ports : - four 10/100/1000BASE-T (RJ-45) or four 1000BASE-X (SFP) OAW-4504XM: • Up to 32 AP (LAN Connected) • Up to 128 Remote AP/Mesh AP	 OAW-4504XM

• Up to 2048 users *Warning: Legacy OAW-4504 is not supported anymore with AOS-W 6.2* *The last supported version on 4504 is AOS-W 6.1* *OAW-4504XM is supported only with AOS-W 6.2 and later versions* OAW-4604: • Up to 64 AP (LAN Connected) • Up to 256 Remote AP/Mesh AP • Up to 4096 users OAW-4704: • Up to 128 AP (LAN Connected) • Up to 512 Remote AP/Mesh AP • Up to 8192 users Embedded Stateful Inspection firewall options allow for robust security solutions.	 OAW-4604  OAW-4704

OAW-4550, 4650 & 4750 802.11ac support • Four 10GBASE-X (SFP+) ports • Two dual-media ports (1000BASE-X or 10/100/1000BASE-T) • One USB 2.0 • Console (RS-232) RJ-45 or mini-USB • LINK/ACT and status LEDs • Management/status LEDs • LCD panel and navigation buttons • Expansion slot (reserved for future use) *Minimum AOS-W 6.2.0 to support OAW-4x50* OAW-4550: • Up to 512 AP (Campus AP) • Up to 512 Remote AP • Up to 16384 concurrent devices OAW-4650: • Up to 1024 AP (Campus AP) • Up to 1024 Remote AP • Up to 24576 concurrent devices	 OAW-4550  OAW-4650  OAW-4750

OAW-4750: • Up to 2048 AP (Campus AP) • Up to 2048 Remote AP • Up to 32768 concurrent devices Embedded Stateful Inspection firewall options allow for robust security solutions.	

A line of OmniAccess WLAN Access Points (APs) designed to address the needs of enterprise wireless LAN deployments. APs include single and dual-radio 802.11a/b/g/n models with a variety of fixed and detachable antenna options.

APs are small, lightweight and can be securely attached in a variety of locations: on walls, in cubicles, on desktops and the ceiling. The AP antenna diversity allows for the best signal processing using dual, omnidirectional antennas.

APs work with all of the OmniAccess 43xx/4x04/6000 series WLAN switches to provide a high performance, centrally managed, wireless mobility solution for enterprises. APs have an extended lifespan because they can automatically configure themselves across any L2/L3 network using a discovery protocol, allowing easy upgrades when new features, capabilities, or standards emerge.

OAW-AP175 Dual-Radio IEEE 802.11n (Outdoor) • 802.11a/n and b/g/n • 2x2 MIMO (two spatial streams) Quad, N-type female interfaces (2 x 2.4 GHz, 2 x 5 GHz) for external antenna support (supports MIMO) 1 x 100/1000Base-T Ethernet port (auto sensing link speed and MDI/MDX) Power: • AP-175P: 48-volt DC 802.3at power over Ethernet (PoE+) • AP-175AC: 100-240 volt AC from external AC power source • AP-175DC: 12-48 volt DC from external DC power source Maximum power consumption is 15 watts	 **OAW-AP175**
OAW-AP104 & AP105 Minimum AOS-W 6.1.3.0 to support AP104 Dual Radio (Indoor) 802.11a/n and b/g/n 2x2 MIMO (two spatial stream) OAW-AP104: 4 x RP-SMA antenna interface connectors for external antenna support (2 per band)	 OAW-AP104  OAW-AP105

OAW-AP105: 4 x integrated, omnidirectional antenna elements (supporting 2x2 MIMO). 1 x 100/1000Base-T Ethernet port 12 V DC for external AC-supplied power	

A line of OmniAccess instant WLAN Access Points (IAPs) based on virtual Controller, Each IAP is eligible to become Virtual Controller.

OAW-IAP175 *Minimum AOS-W 6.1.4-3.0.0.0 to support IAP175* Dual-Radio IEEE 802.11n (Outdoor) • 802.11a/n and b/g/n • 2x2 MIMO (two spatial streams) Quad, N-type female interfaces (2 x 2.4 GHz, 2 x 5 GHz) for external antenna support (supports MIMO) 1 x 100/1000Base-T Ethernet port (auto sensing link speed and MDI/MDX) OAW-IAP175P: 48-volt DC 802.3at power over Ethernet (PoE+) OAW-IAP175AC: 100-240 volt AC from external AC power source	 **OAW-IAP175**
OAW-AP274/2755 Dual-Radio (Outdoor) 802.11ac and b/g/n OAW-AP274 (& OAW-IAP274): 2.4-GHz and 5-GHz radios, each with 3x3 MIMO and three combined, duplexed external antenna connectors OAW-AP275 (& OAW-IAP275): 2.4-GHz and 5-GHz radios, each with 3x3 MIMO and three integrated omnidirectional antennas 1 port 10/100/1000Base-T Ethernet network interface RJ-45 Maximum power consumption: 23 W • Direct AC source: 100 V to 240 V AC • Power over Ethernet (PoE): 48 V DC (nominal) 802.3at-compliant source	 **OAW-AP274/275**
OAW-IAP134 & 135 • 802.11a/n and b/g/n • 3x3 MIMO (3 spatial streams) up to 450Mbps (HT40)	

Interface: 2 x 10/100/1000Base-T (RJ-45) Ethernet interface (Power over Ethernet) OAW-IAP134: support for selectable 802.11 b/g/n or 802.11 a/n operations, 3x3 MIMO dual-band RP-SMA detachable antenna interfaces. OAW-IAP135: same features as AP134 but with embedded 3x3 MIMO dual-band antennas.	 OAW-IAP134 OAW-IAP135
OAW-IAP105 • Dual Radio (Indoor) • 802.11a/n and b/g/n • 2x2 MIMO (two spatial stream) 4 x integrated, omnidirectional antenna elements (supporting up to 2x2 MIMO with spatial diversity) providing up to 300 Mbps data rate per radio 1 x 100/1000Base-T Ethernet port 12 V DC for external AC-supplied power	 OAW-IAP105

A line of Remote Access Points to complement coverage needs.

OAW-RAP3WN/P *Minimum version to support RAP3WN: AOS-W 6.1.4.0 or Instant OS 3.0.0.0* • Single Radio Single Band (2.4GHz only) • 802.11b/g/n only 2x2 MIMO with two spatial streams and up to 300 Mbps Two integrated, omnidirectional antenna elements for 2x2 MIMO • Antenna gain: 2.0 dBi Interfaces: • E0 (WAN): One 10/100BASE-T Ethernet (RJ-45), auto-sensing link speed and MDI/MDX • E1-E2 (LAN): Two 10/100BASE-T Ethernet (RJ-45), auto-sensing link speed and MDI/MDX • RAP3WNP only: 802.3af PoE (15.4 watts) on the E2 port for IP phones and other equipment	 OAW-RAP3WN/P

OAW-RAP108 & OAW-RAP109 *Minimum version to support RAP10x : AOS-W 6.2.0 or Instant OS 3.2.0.0* Dual Radio (Indoor) • 802.11a/n and b/g/n • 2x2 MIMO (two spatial stream) , 300Mbps • Instant or controller-managed • Two 2.4-GHz and 5-GHz radios, • 2x2 MIMO, 300 Mbps • One Gigabit Ethernet uplink, one 10/100BASE-T port, one USB port OAW-RAP108: Two RP-SMA connectors for external dual-band antennas OAW-RAP109: Four integrated omnidirectional antennas for 2x2 MIMO with maximum antenna gain of 3.0 dBi in both 2.4 GHz and 5 GHz. Built-in antennas are optimized for vertical orientation	 OAW-RAP108  OAW-RAP109
OAW-RAP155/P *Minimum version to support RAP10x : AOS-W 6.3.0.0 or Instant OS 3.3.0.0* • Dual radio, dual-band 802.11n indoor • Software-configurable dual radio supports 2.4 GHz & 5 GHz • 2x2 MIMO with two spatial streams and up to 300 Mbps wireless data rate in 2.4 GHz • 3x3 MIMO with three spatial streams and up to 450 Mbps wireless data rate in 5 GHz Interfaces • ENET0 (uplink): One 10/100/1000BASE-T Ethernet (RJ-45), • auto-sensing link speed and MDI/MDX • ENET1-4 (local): Four 10/100/1000BASE-T Ethernet (RJ-45), • auto-sensing link speed and MDI/MDX • ENET1 and ENET2 capable of sourcing PoE power (RAP-155P only)	 OAW-RAP155/P

3.3.5.1.3 OmniAccess® Stellar WLAN

(For more details, refer to the Product Line Matrix and related datasheets)

OAW-AP1101 Indoor wireless access point • 802.11a/b/g/n/ac wave1 (Dual Band concurrent) • 5 GHz: 802.11ac very high throughput (VHT) support: VHT 20/40/80 • 2.4 GHz: 802.11n high-throughput (HT) support: HT 20/40 • One 10/100/1000 Mb/s full/half-duplex Ethernet (RJ-45) • PoE-PD: 48 V DC (nominal) 802.3af or 802.3at PoE • Built-in antenna 2×2: - 2, 3.4 dBi at 2.4 GHz - 3.96 dBi at 5 GHz The Access Point group (AP-Group) is an autonomous system including a group of OmniAccess AP1101s and a distributed controller, which is a selected Access Point for AP-Group management. One AP-Group supports up to 16 OmniAccess AP1101s, 256 concurrent clients, and 16 WLANs (SSID).	 **OAW-AP1101**
OAW-AP1201 Indoor IoT Ready 802.11ac Wave 2 wireless access point	 **OAW-AP1101**
OAW-AP1201H Indoor Hospitality high-performance 802.11ac Wave 2 access point	 OmniAccess Stellar AP1201H

OAW-AP1220 Series Indoor high performance 802.11ac Wave 2 wireless access points	 AP1221 AP1222
OAW-AP1230 Series Indoor ultra high performance 802.11ac Wave 2 wireless access points	 AP1231 AP1232
OAW-AP1251 Outdoor 802.11ac Wave 2 wireless access point	

ALE International completes the WLAN offer with a line of professional WLAN handsets.

3.3.5.1.4 Cisco compatibility

The 8158s/8168s VoWLAN Handsets can be included in a Cisco WLAN environment.

Wireless switches and access points are provided by Cisco, WLAN handsets and the Communication Server are provided by ALE International.

8158s/8168s VoWLAN Handsets are compliant with the CCXv2 Cisco proprietary standard.

3.3.5.1.5 LAN standards and certifications

The Alcatel-Lucent OmniAccess Wireless system is Wi-Fi Alliance certified for 802.11a/b/g/n.

For a list of compliant WLAN controller/Access Point combinations and associated certification IDs, please refer to the following website:

http://certifications.wi-fi.org/wbcs_certified_products.php

The Alcatel-Lucent OmniAccess Wireless system is Wi-Fi Alliance certified for WPA and WPA2 (personal and enterprise).

Terms and Definitions

Campus / LAN: network	A topology where: There is no restriction in terms of bandwidth All IP components (8158s/8168s VoWLAN Handsets, IP Phones, CS, MG, …) are located on the same LAN/MAN network (L2 or L3) All IP components (8158s/8168s VoWLAN Handsets, IP Phones, CS, MG, …) can be located on the same geographical site or on several sites
WAN / multi-sites: network	A topology where: There is some restriction in terms of bandwidth between sites All IP components (8158s/8168s VoWLAN Handsets, IP Phones, CS, MG, …) are located in different IP subnet (in function of topology) All IP components (8158s/8168s VoWLAN Handsets, IP Phones, CS, MG, …) are located in different geographical sites (HQ, regional sites and Branch Offices)
Single CS	IPPBX based on an OmniPCX solution with a primary Communication Server and (optionally) secondary Communication Server
Multi-CS	IPPBX based on OmniPCX solution with Communication Servers interconnected via ABC-F2 protocol
IP domain	OmniPCX function used in multi-sites configuration to limit the number of simultaneous voice communications with the users belonging to a site (Call Admission Control – CAC) Define a voice compression/coding algorithm for the extra domain (site) communications (recommendation: G729) and a voice compression / coding for the intra domain (site) communications (recommendation: G711). Generally, in Campus / LAN architecture, IP domains are not used because: There is no IP bandwidth restriction; so, it is not necessary to limit the number of communications between 2 locations G711 algorithm is used to code the Voice over IP flows

Roaming	Refers to the ability to be reached (i.e.: making and receiving calls) in a different Site or Network. Inside a site or a network, roaming provides a wireless device the capability to associate to an AP after a power-on or a reset of this device.
Handover	Refers to the ability to move from one AP coverage area to another AP without service disruption or loss in connectivity.
VLANs	These can be used to segment the IP network logically (e.g. voice and data segmentation) Generally, one VLAN ID is associated to one IP subnet. It is recommended to create: One voice VLAN for IP Phones, WLAN phone sets, IP Media Gateways One data VLAN for WLAN laptops and desktops One VLAN for signaling between WLAN switches (used when tunneling is necessary between WLAN switches and a routing function is required) As in a traditional data infrastructure, all WLAN switches and Access Points can be managed in several IP subnets Note: For a large quantity of WLAN phone sets ALE International recommends segmentation into several Voice VLANs

3.3.5.2 VoWLAN communication services and features

3.3.5.2.1 Access to the OmniPCX Enterprise Communication Server services

The VoWLAN Handsets are fully integrated in the OmniPCX Enterprise Communication Server and offer a set of communication services. Available during conversations or from the idle state, these services are easily activated to improve the communication capabilities in business environments.

The 8158s/8168s VoWLAN Handsets use the Alcatel-Lucent International New Office Environment (NOE) protocol, are fully compatible with the OmniPCX Enterprise Communication Server and access services transparently.

The 8158s/8168s VoWLAN Handsets offer Voice over WLAN SIP communications via the SIP interface of the OmniPCX Enterprise Communication Server.

The 8168s VoWLAN Handsets offer voice and messaging features and alarm feature with duress button.

Note 1: For current 8158s/8168s VoWLAN Handsets details and specifications see Mobile Telephones

During conversation, menus can be used to activate current IP phone call capabilities such as:

- Consultation call
- Broker call/Three-party conference
- Transfer
- Activation of one programmable key
- Callback request

When the phone is not in active use, menus are available to deal with working requirements to manage:

- Call forwarding
- Last caller callback
- Last number redial
- Call pickup
- Waiting call consultation
- Call Park/Retrieve
- Do not disturb
- Wake up/Appointment reminders
- Room status management
- Suite Wake up (hotel configuration)
- Password modification
- Meet me conference call organization
- Hunting group participation
- Voice mail consultation
- Business account code management
- Associated Set modification

Note 2: The preceding lists are not exhaustive. For more details see the OmniPCX Enterprise Communication Server feature list.

Messaging example

Messages are indicated with the presence of an envelope icon. 

By using the Menu button, Messaging can be selected. In this example, one voice mail message and one callback request are present. When the personal code is validated access to the messages is granted.

3.3.5.2.2 Quality of Service (QoS)

On a converged network, voice packets must be identified and prioritized to avoid any voice service degradation due to simultaneous data traffic. To ensure excellent voice quality, ALE International's offer uses VMM prioritization mechanism between Omni Access WLAN infrastructure and 8158s/8168s VoWLAN Handsets to ensure voice quality on an Alcatel-Lucent wireless converged network.

WLAN QoS is performed by the OmniPCX Enterprise Communication Server and the WLAN Controller, provided all the WLAN handsets are 8158s/8168s VoWLAN Handsets.

Configuration using WLAN infra

The 8158s/8168s VoWLAN Handsets support Wi-Fi MultiMedia (WMM), U-APSD, and Tspec for QoS features.

- In-call battery life is improved using U-APSD mode

Configuration with Cisco switches

In a Cisco environment, QoS is provided by switches and APs.

Switches and APs provide priority queuing for voice packets and AP access control.

3.3.5.2.3 Call Admission Control (CAC) and Wi-Fi CAC

The Communication Server performs Call Admission Control (CAC) to manage simultaneous communications in a multi-site environment, in order to avoid tromboning and bandwidth issues on the WAN.

CAC is performed by the WLAN switch: CAC parameters are defined per switch/AP group. Wi-Fi CAC parameters are based on the maximum number of calls per AP or on the usable bandwidth per AP.

In order to avoid bandwidth issues on APs, CAC (Call Admission Control) limits the number of voice calls using the same AP.

3.3.5.2.4 Security

Several security levels can be implemented to authenticate 8158s/8168s VoWLAN Handsets (from lowest to highest level):

- Open System: no protection. Everybody can connect to the system. This solution is used for public hotspot.
- WEP: authentication is based on a key shared by the switch and handsets. Data encryption is based on the RC4 algorithm (Currently considered as not-secured)
- WPA: authentication is based on a key shared by the switch and handsets. Data encryption is based on the TKIP algorithm
- WPA2-PSK (also named WPA2-Home): authentication is based on a key shared by the switch and handsets. Data encryption is based on the AES algorithm.
- WPA2-Enterprise: a radius server (compliant with the IEEE 802.11i standard) is used for authentication. Two authentications methods can be used:
    - EAP-Fast: Mutual authentication is based on a shared secret
    - PEAP/MSCHAPv2: Radius Server authentication is based on a certificate
    - EAP-TLS: Mutual authentication based on certificates

  Since authentication is required for each AP association, roaming between APs generates voice breaks due to re-authentication duration. The fast handoff feature limits the break time. After a first authentication with the radius server, re-authentications due to AP roaming are simplified, data stored in switches and APs are used and the radius server does not need to be reached.

There are two fast handoff methods:

- OKC (Opportunistic Key Caching): a standard method specified in the 802.11i standard
- CCKM (Cisco Centralized Key Management): a Cisco-proprietary fast AP handoff method, only supported on Cisco APs

3.3.5.2.5 DSCP tagging

Packets (voice and data) over the WLAN infrastructure carry their own priority in a DSCP tag. Switches use this tag to process packets with the highest priority level first.

8158s/8168s VoWLAN Handsets and Communication Servers tag voice packets to the highest priority.

Typically, the priority level is set to:

- Voice packets: 48 (DSCP value set directly by the 8158s/8168s VoWLAN Handsets)
- Video packets: 46
- Best effort packets: 0
- Data packets: 0

3.3.5.2.6 Compression algorithm

G711 and G729A:

Multi-Site configuration (one Communication Server):

- G711 in Intra-domain and G729A in Inter-Domain (WAN)

Multi-Node Configuration:

- G711 in Intra-Node and G729A in Inter-Node (WAN)

3.3.5.2.7 Survivability

DHCP

8158s/8168s VoWLAN Handsets need IP parameters to operate. When handsets are configured to acquire IP parameters from a DHCP server, they send a DHCP request message at each power on.

- If a DHCP server answers, the handset stores IP parameters in its flash memory
- If no DHCP server answers after several attempts, the handset tries to use IP parameters previously stored in its flash memory.

The handset checks if the previous leased IP parameters are not reused:

- If IP parameters are not reused, the handset declares these parameters as valid and uses them
- If IP parameters are reused by another host, the handset tries new DHCP requests until it discovers an available DHCP server

TFTP server

8158s/8168s VoWLAN Handsets need their configuration files to operate. This configuration file is downloaded from the primary TFTP server hosted in the Main Communication Server or from the redundant TFTP server hosted in the Standby Communication Server when the primary TFTP server is not available.

When no TFTP server is available, the handset tries to connect to the PCS (Passive Communication Server) with the IP address stored in its flash memory.

When all these attempts fail, the handset reboots and tries again.

3.3.5.2.8 Localization service

The WLAN infrastructure can include an Ekahau Real Time Localization System (RTLS). This system periodically receives localization Wi-Fi information from handsets.

The Ekahau Positioning Engine uses the WLAN network topology to calculate the location of the mobile devices.

At a configurable interval, the 8158s/8168s VoWLAN Handsets scan the environment for access points. All access point identities and their measured radio field strength (RSSI) are collected and reported to the positioning engine

The Ekahau Positioning Engine calculates the location of the 8158s/8168s VoWLAN Handsets by using the RSSI measurements to triangulate the mobile devices within the WLAN environment, as soon as the access point report is received.

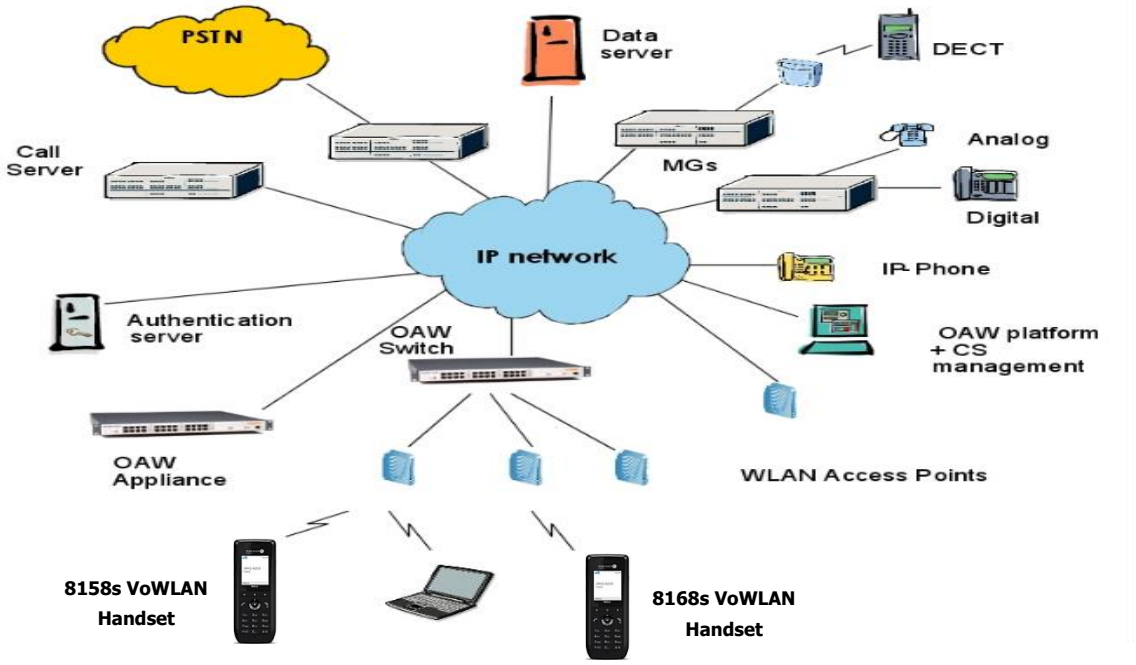
Note: This service is **only** available on 8158s/8168s VoWLAN Handsets.

3.3.5.3 Topology and architecture

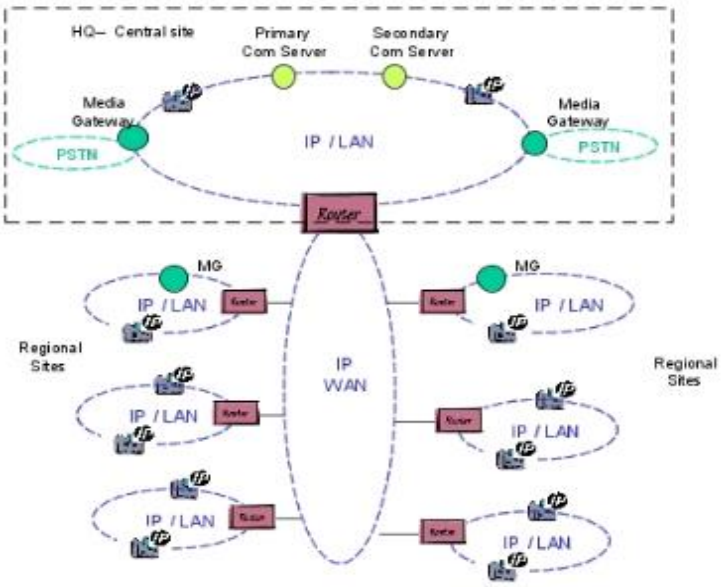
3.3.5.3.1 Global architecture

An OmniPCX Enterprise Communication Server can handle different types of sets connected through IP:

- Legacy sets behind an IP Media Gateway (e.g. analog, DECT, Alcatel-Lucent sets)
- IP Phone sets (e.g. IP Touch hard-phone, soft-phone)
- 8158s/8168s VoWLAN Handsets



Example of VoIP architecture



In the following sections some architecture examples are described to demonstrate VoWLAN solutions that can be implemented.

3.3.5.3.2 VoWLAN topology and architecture examples

Campus – LAN – single communication server architecture

The ALE International VoWLAN solution can be deployed in a single site environment regardless of the data network architecture. User roaming and handover are possible even if the data network is

segmented at Layer 2 or 3. Access Points, as 8158s/8168s VoWLAN Handsets, can belong to different IP sub-networks.

The ALE International solution offers an inter-Wireless switch and Inter IP Sub-network mobility.

The OmniPCX Enterprise Communication Server can handle up to 15,000 sets.

In this architecture, communications are coded with the G711 algorithm to favor the voice audio quality.

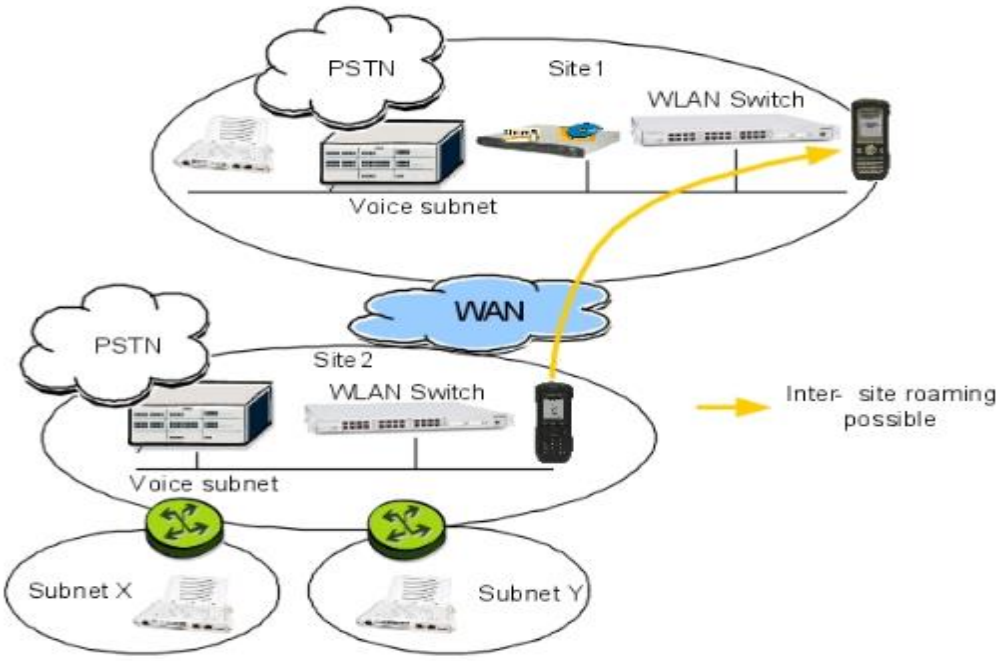
Multi-site – WAN – single Communication server architecture

The ALE International VoWLAN solution can be deployed in a multi-site environment, even if the call processing function (Communication Server) is centralized on one site.

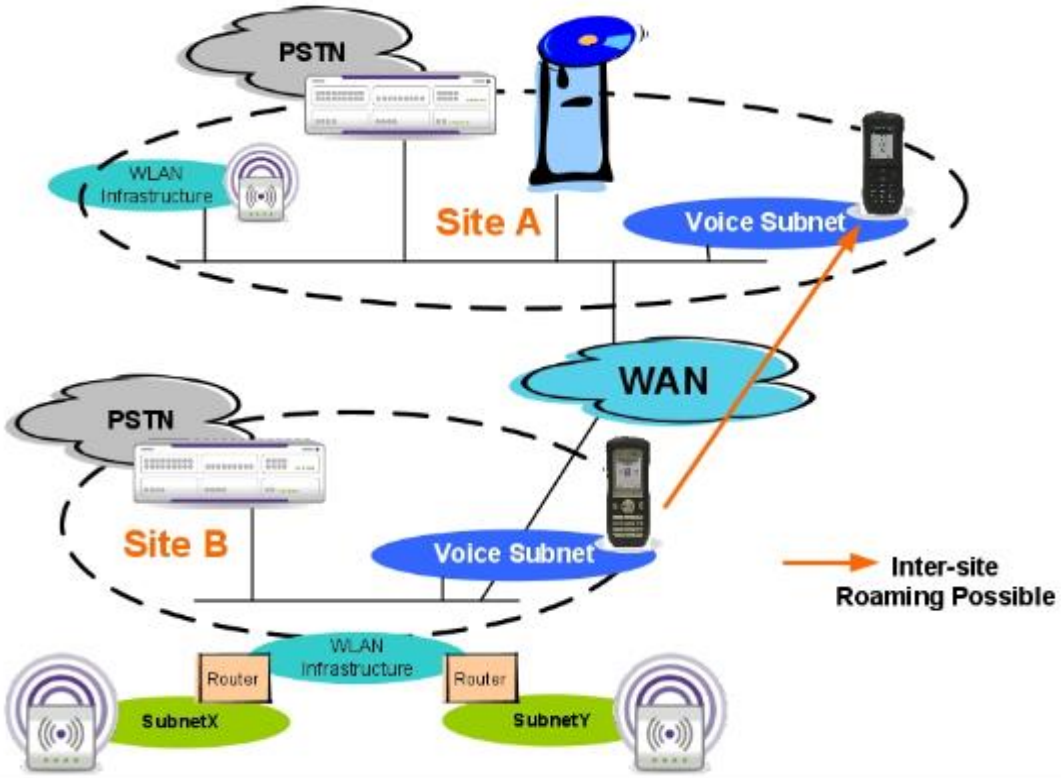
Generally, the bandwidth is limited on the WAN connecting the remote site. This means that the number of simultaneous communications with other sites must be configured. The central Communication Server performs the Call Admission Control (CAC). When an 8158s or 8168s VoWLAN Handset changes sites, its IP address changes automatically. So, the handset is automatically located in the corresponding IP domain allowing the Communication Server to control CAC correctly.

User roaming is possible between sites, provided the CAC limits for access points are not reached.

At least one Wireless LAN Switch is mandatory on each site.



In a multi-site topology interconnected by WAN (limited bandwidth), at least one Wireless LAN switch is mandatory on each site.



In general, communications are coded with:

- The G711 algorithm on a given a site, to favor voice audio quality
- The G729 algorithm between sites, to favor bandwidth

If G729 is used for 8158s/8168s VoWLAN Handset communications, all communications (including other IP Touch phones) will use this compression algorithm.

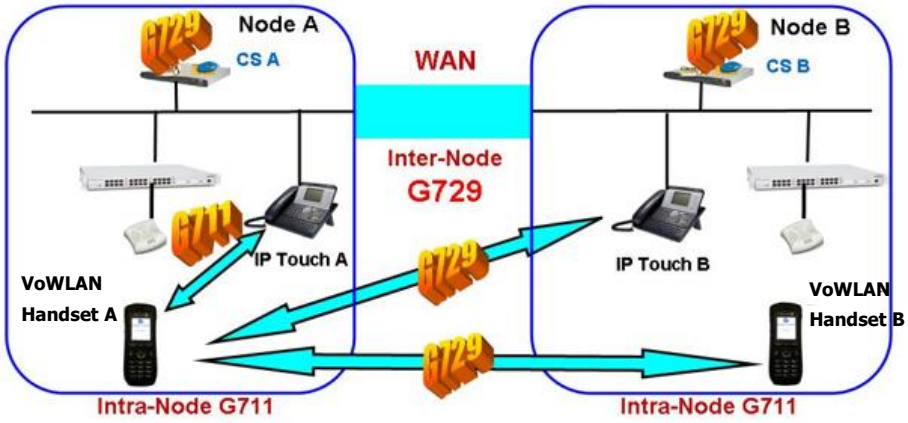
Direct RTP in an inter-site architecture

With the introduction of Direct RTP and the Dual Stack NOE and SIP protocol for the 8158s/8168s VoWLAN Handsets, calls are treated more economically on an inter-site basis.

The following diagrams indicate the call progression from 8158s/8168s VoWLAN Handset A to 8158s/8168s VoWLAN Handset B via the WAN without compression/decompression.

- IP domains are used to perform CAC control on the WAN
- G711 in Intra-domain (Sites A & B)
- G729A in Extra-domain (WAN)

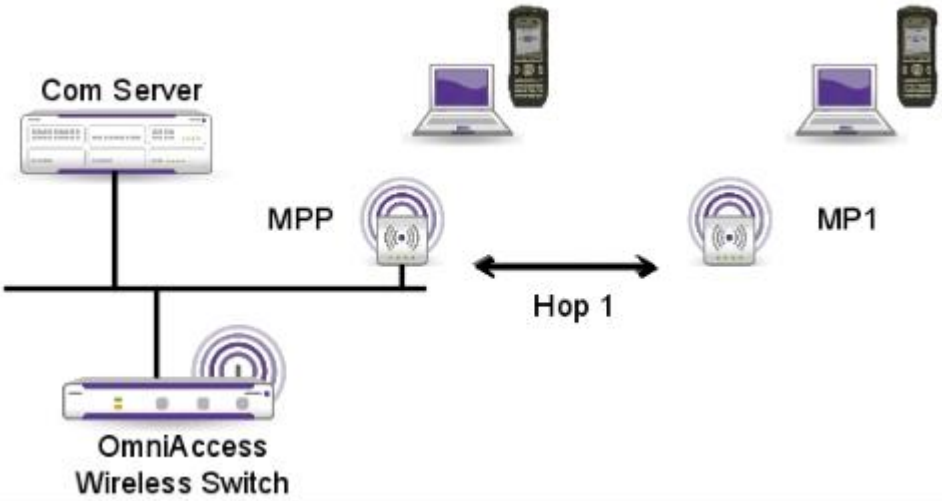
The call is treated as RTP traffic between the 8158s/8168s VoWLAN Handsets A and B.



3.3.5.3.3 Mesh access point topologies

A mesh is a WLAN network where an access point is linked to another AP in order to extend Wi-Fi coverage (backhauling) or to extend a LAN (mesh bridging).

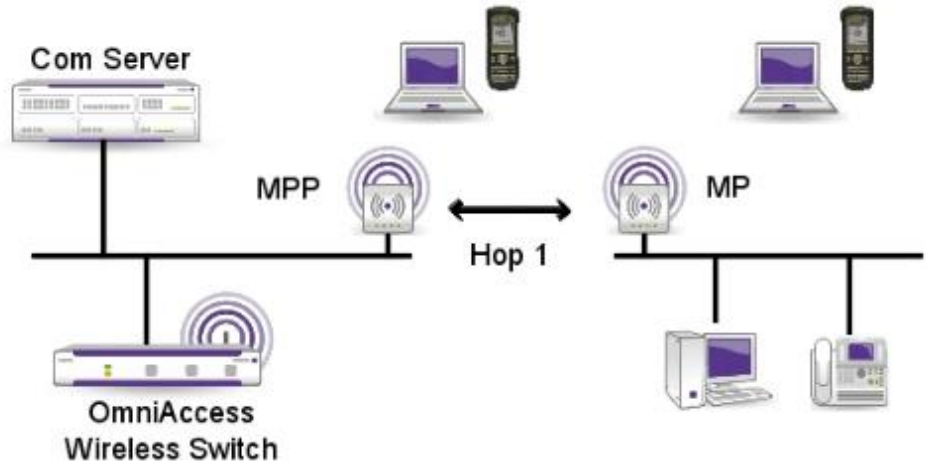
Mesh backhauling



This topology, which is a basic backhauling configuration, includes two kinds of Access Points (AP):

- **Mesh point** (MP): this AP is connected to the mesh portal via a wireless link.
- **Mesh PORTAL** (MPP): this AP is connected to the OmniAccess Wireless switch via a wired link. This mesh portal may connect WLAN clients.

Mesh bridging



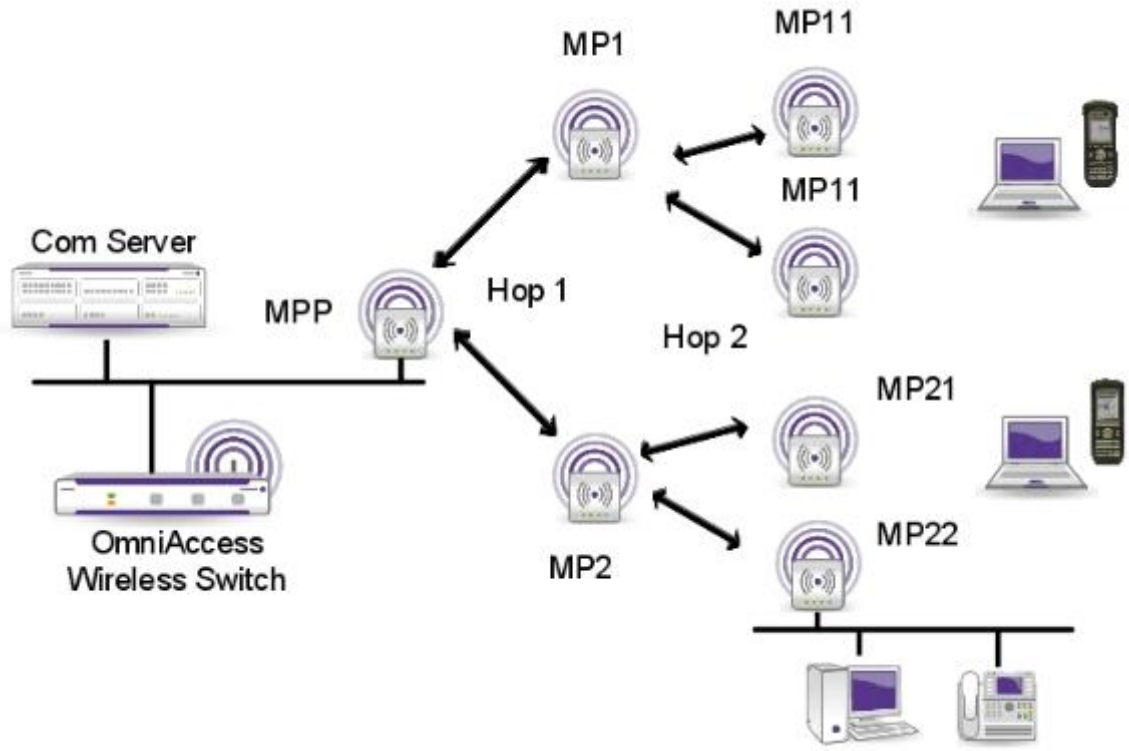
Mesh bridging provides communications (voice and data) from one LAN to another LAN via a radio link.

CAC limitation only applies to VoWLAN handsets.

The mesh portal and mesh point may connect WLAN clients.

Complex topology example

Multi hops, backhauling and mesh bridging can coexist in the same mesh.



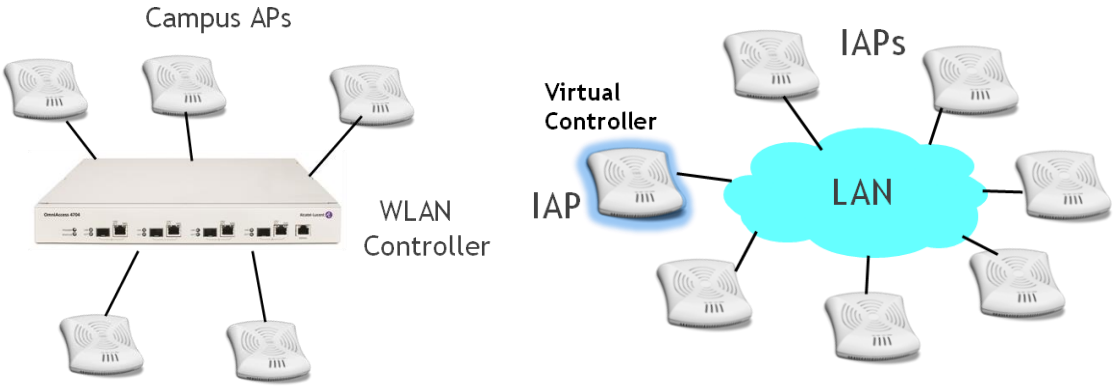
WLAN configuration recommendations:

- Compression algorithm: G711
- Framing: 20ms

- Security: WPA2/PSK
- Standard mode: 802.11a or 802.11g or 802.11n

3.3.5.3.4 Instant access point

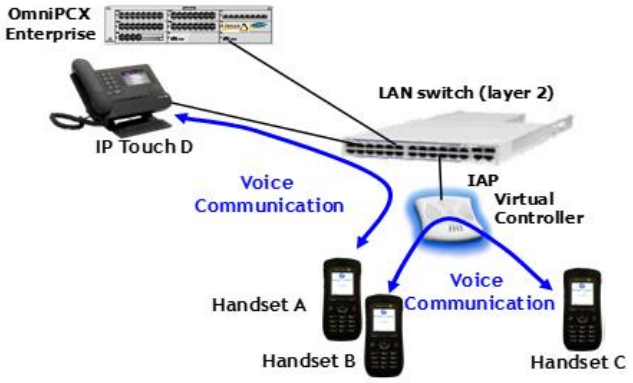
Instant AP is a controllerless WLAN solution based on a Virtual Controller (VC) and does not require any license.



Controller Based Solution **Instant AP Solution**

The OmniAccess Instant can be installed at a single site or deployed across multiple geographically-dispersed locations. Up to 16 OmniAccess Instant Access Points (IAPs) can be controlled by a single IAP that automatically becomes a primary virtual controller.

The VoWLAN solution is also available for an Instant Access Point infrastructure.



VoWLAN Handsets

81x8s VoWLAN Handsets are supported on Instant AP

IAP behavior is similar to a Campus AP managed by a WLAN controller:

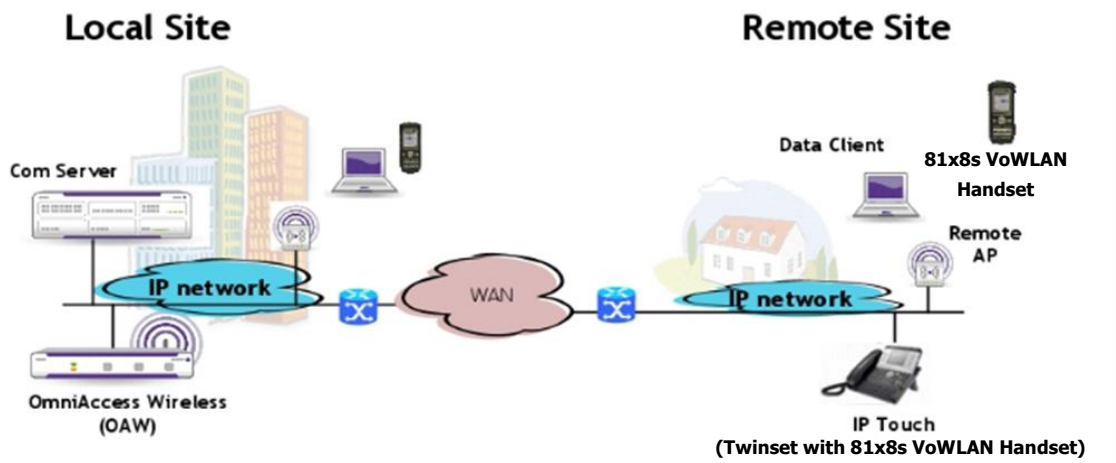
- Direct RTP between handset A and IP Touch D, and between handsets B and C

The single IAP acts as Virtual Controller

3.3.5.3.5 Remote access point

The remote access point feature allows an Access Point to be deployed on a remote site and be securely connected to the WAN controller using a VPN over the WAN.

Typically, a remote AP is used to link a home worker to a headquarters office (only one voice user per remote AP).



Intranet: this network is trusted; firewalls and NATs (Network Address Translation) are not required

Internet: this network, not trusted, requires firewalls and NAT on a remote and/or local router. Remote IP touch sets are not supported. VPN used on remote access points avoids NAT issues.

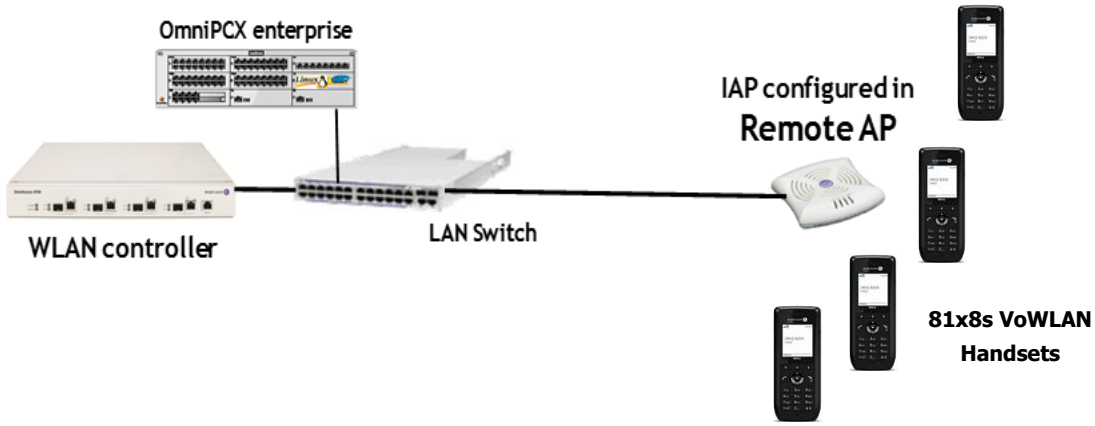
The IP Touch and the 81x8 operate in twinset mode.

The required bandwidth can be calculated with the following information:

- One call from an IP Touch requires 150kb bandwidth
- One call from an 81x8 requires 140kb bandwidth

The remote AP can also be deployed behind an ADSL Wi-Fi router.

Depending on the available WAN bandwidth, several 8158s/8168s VoWLAN Handsets can be deployed on the remote AP as in figure: Remote access point - multi-session



3.3.5.4 VoWLAN handsets

ALE International offers the industry's most versatile and complete wireless solution for the workplace. Mobile IP Touch Wireless Telephones are designed for a broad range of enterprise applications, from general office to industrial use.

The 8158s/8168s VoWLAN Handsets provide:

- Time saving benefits for voice and data applications

- Alcatel-Lucent proprietary protocol phone services such as caller name display for phone book members or SIP protocol
- Excellent voice quality throughout the workplace
- Improvements for mobility, responsiveness, and productivity

The lightweight 8158s/8168s VoWLAN Handsets are extremely simple to use, require minimal training, and are durable enough to withstand the rigors of workplace use. The rugged design has no moving parts or external antenna.

A complete set of accessories is available including configuration cradle, mass deployment server (ims3 server), headsets, chargers, and carrying cases.

8158s/8168s VoWLAN Handsets offer more than just telephone communication.

A push-to-talk functionality is available with the 8158s/8168s VoWLAN Handsets to broadcast communication between employees, eliminating the need for two-way radios or walkie-talkies.

By using a duress (panic) button, the 8158s/8168s VoWLAN Handsets can send an alarm to an Alarm server (Mobicall, OTNS). Alarm is generated by a voice call preprogrammed to a dedicated Alarm server.

By putting Wireless to Work, ALE International has helped many commercial enterprises improve productivity, responsiveness, and customer service.

ALE International's enterprise telephony integration capabilities, standards-based wireless architecture, excellent voice quality, and portfolio of handsets make Mobile IP Touch wireless telephones the right choice for wireless LAN telephony.

The OmniPCX Enterprise Communication Server R10.0 supports configurations without any additional servers for WLAN handsets in an Alcatel-Lucent WLAN infrastructure. The 8158s/8168s VoWLAN Handsets support:

- 802.11e Wi-Fi Multimedia (WMM)
- Enhanced Distributed Channel Access (EDCA)
- WMM Power Save (U-APSD)

8158s/8168s VoWLAN Handsets are compliant with Call Admission Control, based on TSPEC & WMM Admission Control (AC), as well as CCXv2.

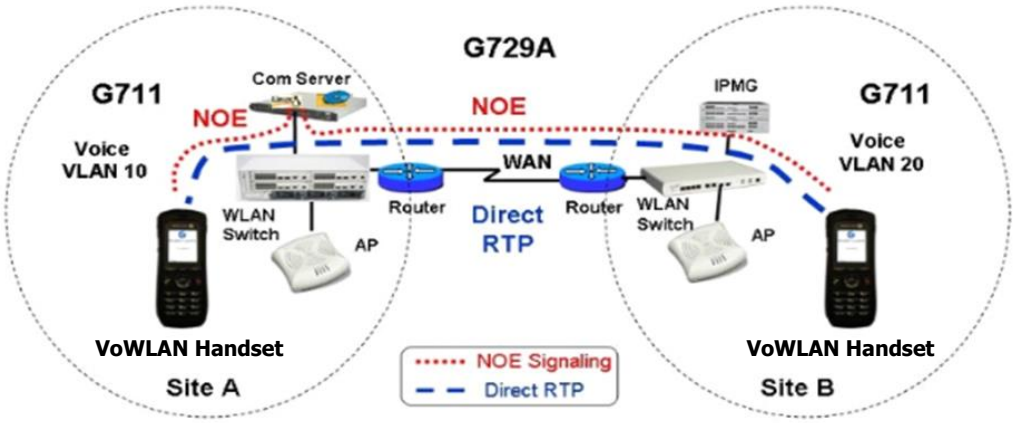
With the implementation of Direct RTP and New Office Environment (NOE) protocol or SIP protocol on 8158s/8168s VoWLAN Handsets, calls are handled transparently. 8158s/8168s VoWLAN Handsets communicate with every other set in the same way as an IP Touch set.

Note: For details about 8158s/8168s VoWLAN Handsets compatibility, refer to the "8158s/8168s VoWLAN Handsets on Specific WLAN Infrastructures" Premium Customer Support available from the Enterprise Business Portal.

The following diagrams indicate the call progression from a VoWLAN Handset Site A to another VoWLAN Handset in site B via a WAN and without additional compression/decompression.

Reminder: IP Domains are used to perform CAC control on the WAN:

- G711 in Intra-domain (Sites A & B)
- G729A in Extra-domain (WAN)



In a Site to Site configuration, a call between two VoWLAN handsets (8158s/8168s VoWLAN Handsets) is treated as an IP Touch phone call with the implementation of Direct RTP. The G711 algorithm is used for local communication on each site and G729A is configured on the WAN to reduce bandwidth consumption.

Security

Wi-Fi sets support the WPA2 security mechanism. This protocol is based on the final IEEE 802.11i amendment of the 802.11 standard.

WPA2, like WPA, has two operational modes: Enterprise and Personal.

Enterprise mode uses:

- PEAP-MSCHAPv2
- EAP-TLS
- EAP-FAST

Personal mode:

- Based on a PreShared Key model, WPA2, like WPA, creates a new session key at every association.

The encryption keys used for each client are unique on the network and specific to each client. Ultimately, every client sends packets over the air, encrypted with a unique key. WPA2 is more robust than WPA. WPA2 uses the AES encryption algorithm instead of RC4 Security (used by the first version of WPA).

Rogue AP detection is performed by the WLAN controller.

Site requirements

The existing WLAN infrastructure must be studied for compatibility with the Wi-Fi telephony. This includes the following tasks:

- All WLAN products must be part of a certified list for compliancy.
- The topology must provide enough bandwidth for voice communication.
- The IP scheme used (L2 and L3) needs to be analyzed to fit the architecture.

To ensure correct RF coverage for providing seamless handovers, a Voice site survey is mandatory.

Refer to the document: "8158s/8168s VoWLAN Handsets on Specific WLAN Infrastructures" available on the Business Portal.

3.3.6 OmniMobility DECT

3.3.6.1 DECT infrastructure

To meet corporate user mobility requirements in company premises, the OmniPCX Enterprise Communication Server offers a wireless telephone service based on the international DECT (Digital Enhanced Cordless Telecommunications) standard.

The DECT standard is a cellular technology that uses the 1880/1900 MHz frequency band. DECT is available:

- In all European countries
- In a large number of Asian and African countries. The 1900/1930 MHz bandwidth is used for Thailand and Latin American.

The DECT standard is designed to provide mobility services in environments with high user density such as large buildings or campuses: 10 000 Erlangs/Km sq. (GSM 200 Erlangs/Km sq., DCS 500 Erlangs/Km sq.).

This standard is based on a digital technology providing high quality communication, with Roaming and Handover (Handoff) capabilities.

CDCS (continuous dynamic channel selection) is a unique feature that ensures that every mobile phone operates on the best available radio channel. In addition, no frequency planning is required when adding a radio base station. All base stations can transmit on any channel.

The OmniPCX Enterprise Communication Server integrates mobility components based on the DECT technology, offering ergonomics, security, with a user-friendly management interface.

The DECT wireless solution is fully integrated with the OmniPCX Enterprise VoIP & TDM solutions. A DECT (Digital Enhanced Cordless Telecommunications) set is seen as a TDM UA set using the AGAP (Alcatel-Lucent Generic Access Profile) protocol.

3.3.6.1.1 Alcatel-Lucent DECT mobility components

The DECT mobility service is built by connecting DECT radio base stations to the OmniPCX Enterprise. This infrastructure offers indoor and/or outdoor radio coverage enabling any DECT handset to be connected to OmniPCX Enterprise services and applications, and to operate as any other proprietary extension of the OmniPCX Enterprise.

A DECT phone set is a mobile device that can be used as users move around. Using their DECT handset, users can make or receive calls and also use phone services in the same way as UA Reflexes (digital) telephone users.

The base station is the radio interface between the DECT handset and the OmniPCX Enterprise which provides the corporate phone services. An individual base station has a range of approximately 300 meters in an open geographic area. This area is referred to as a "cell" and the combined group of cells is referred to as the "coverage area." An OmniPCX Enterprise can support several base stations

The DECT solution offers user mobility and roaming services to make a call and maintain the communication while physically moving from one cell to another cell pf the company coverage area. The OmniPCX Enterprise maintains each call during handoffs between cells.

Alcatel-Lucent DECT products offer optimized base stations:

- IP-DECT Base Station, named 8378 IP-xBS, available in three versions:

Indoor use:

8378 DECT IP-xBS indoor with internal antennas

8378 DECT IP-xBS indoor for external antennas

Outdoor use:

8378 DECT IP-xBS outdoor with external antennas

8378 IP-xBS Base Station is directly handled by the Communication Server via an IP connection allowing up to 11 simultaneous calls.

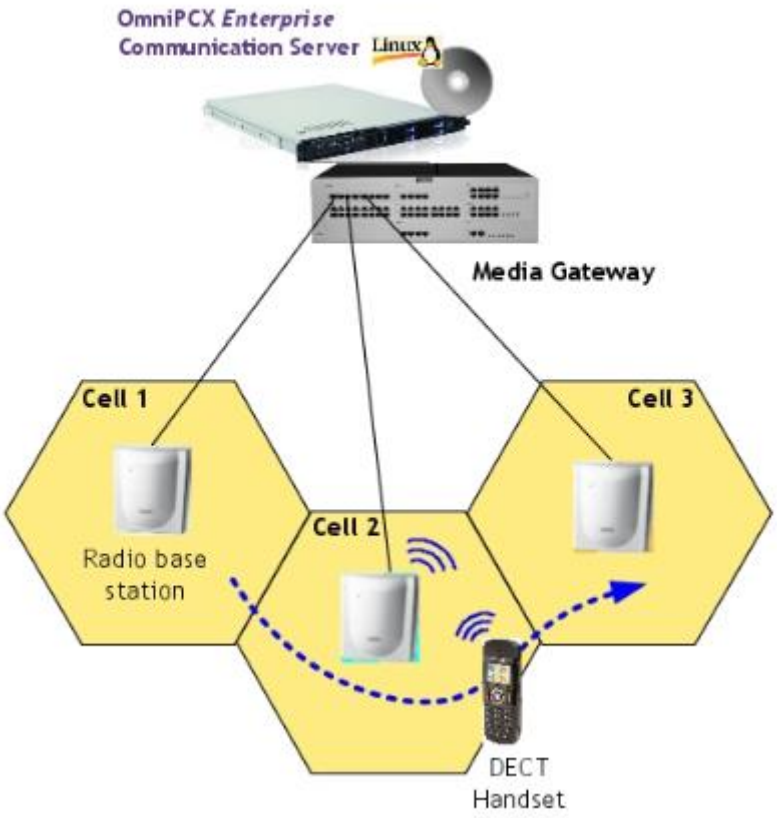
- TDM Base Station available in two versions:
  - Intelligent Base Station (IBS) available in two versions: indoor (8379 base stations Integrated antennas) and outdoor (8379 outdoor bases stations). IBS can be connected to UA boards (Crystal Hardware) or UAI/MIX boards (Common Hardware) allowing up to 6 simultaneous calls.

8379 Indoor

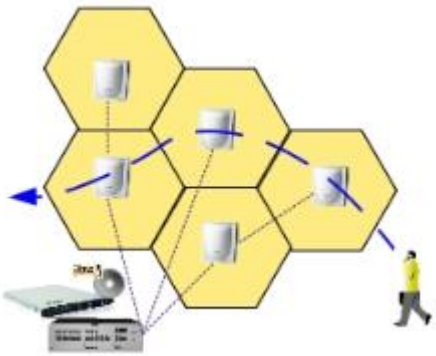
8379 outdoor

  - Radio Base Station (RBS). RBS are connected to DECT boards on Crystal Hardware allowing up to 12 simultaneous calls.

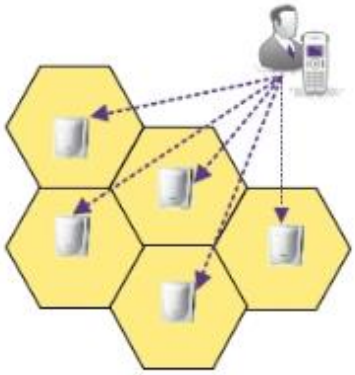
A professional DECT wireless devices called 8212, 8232, 8242, 8262 and 8262Ex DECT Handset. These DECT Handsets offer access to the same OmniPCX Enterprise voice services as TDM or IP desktop phone sets.



Alcatel-Lucent DECT products provide an optimal traffic capacity, a high voice quality and seamless roaming and handover between cells:



Handover: During a conversation, a mobile user can move within the company premises without any interruption or interference.



Roaming: A mobile user can make or receive calls from any location in the OmniPCX Enterprise radio coverage area. The DECT handset is always synchronized with a radio base station and can switch from one base station to another.

To cover a site, radio base stations, connected to the OmniPCX Enterprise, are mounted to create a private cellular network.

A radio coverage survey is necessary and must be conducted to define the number of base stations needed at specific locations. All internal calls are free of charge. External calls bear the same cost as calls from any wired phone.

The signaling for the base station and the DECT sets is included in the media gateway signaling. For each media gateway, the signaling bandwidth needed is about 9.6Kbps for 250 users. The protocol used is UA signaling end to end.

3.3.6.1.2 High level architecture

The ALE International DECT solution is an integral part of the OmniPCX Enterprise system. DECT relies on a mix of wired and wireless infrastructure. The Communication Server establishes end-to-end signaling with the DECT set. This makes it possible to deploy DECT sets at any one of the remote site by connecting the base stations to the Media gateways.

A Communication Server manages all the sets (wired or wireless) at the sites through signaling links. Signaling is direct to IP sets, but for TDM and DECT sets signaling, is established via the Media gateway. Every set configured on the Communication Server is visible in the OmniPCX Enterprise network, which entails that DECT users can make and receive calls to/from any user in the network.

The media gateway communicates with the DECT sets via the base stations connected to the digital ports (UA). Up to the base station, the physical characteristics correspond to the OmniPCX Enterprise digital port physical characteristics (based on 3B+D architecture). Beyond the base station, Alcatel-Lucent DECT abides by standard DECT wireless technologies. DECT handsets have their signaling link established with the Communication Server, as long as it is within the base station coverage. Users can move with their set across the DECT coverage area and can communicate with no interruption. The seamless handoff between base stations belonging to a media gateway is what makes this possible. The roaming feature allows users to visit, be recognized, and use all the services available at their originating site.

Each DECT set configured within the user database of the system has a unique number. The DECT set has all the characteristics defined for a wired extension and can access to all the available system services. The DECT set is assigned to the IP Domain and the entities configured of the site. Therefore, it follows the site routing characteristics while making or receiving calls.

[End of response]

3.3.6.1.3 Architecture providing DECT services

For Golden RFP

The OmniPCX Media Gateway is equipped with a hardware board which connects to a base station. The base Station connects to a UA (digital) port on the Media gateway. There are several types of boards providing UA ports:

UAI board

The UAI board comes in different models: UAI4, UAI8, or UAI16

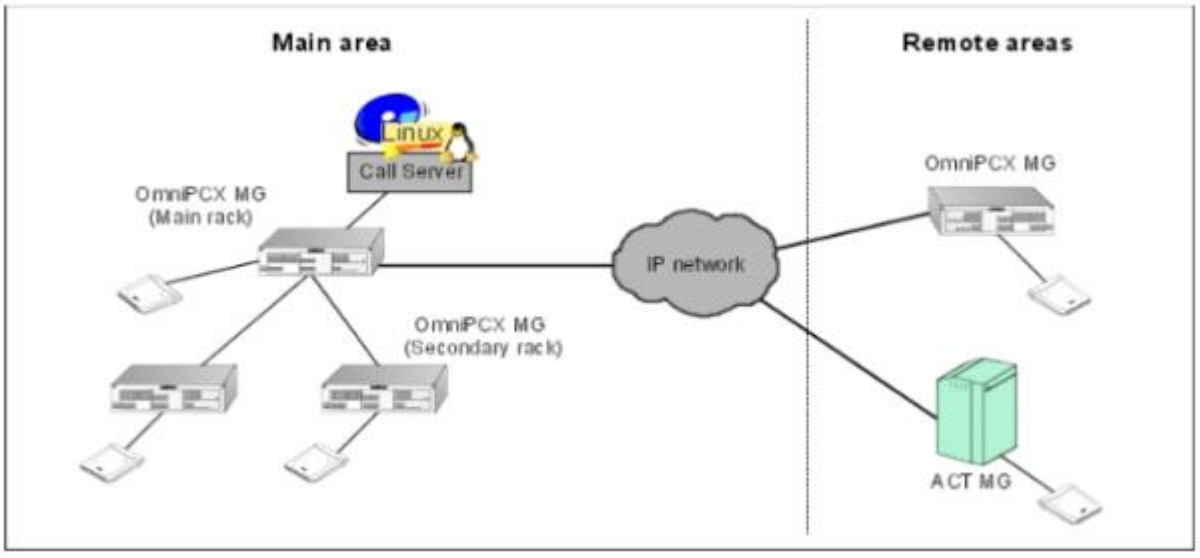
Mixed board

The Mixed board provides mixed interfaces: ISDN (T0) / UA / analog (SLI) out of all the installed mixed boards; the UA port support is 0, 2, or 4.

Reference	Modularity		
	T0	UAI	SLI
MIX4/8/4	4	8	4
MIX4/4/8	4	4	8
MIX2/4/4	2	4	4

Each base station is connected to two consecutive ports on a UAI or MIX coupler board. The master link for each base station must be declared in system configuration settings on an even-numbered equipment location (e.g., 4) and physically connected to the board by a 2-pair cable.

The following diagram illustrates the architecture details:



A site survey is mandatory and is the only way to determine the number of necessary base stations and avoid gaps in user coverage.

3.3.6.2 Radio base stations

3.3.6.2.1 Optimized indoor base station (8379 DECT BS Integrated Antennas indoor)

The 8379 DECT BS integrated antennas indoor is designed for cost-effective radio coverage and provides six simultaneous communication channels. The radio base station characteristics are:

- Radio coverage from 50 meters to 300 meters (approximately 55 yards to 328 yards) depending on location and environment
- Connections to the OmniPCX ACT:
  - Two adjacent standard UA ports
  - Twisted-pair cable (maximum distance: 1200 meters / approx. 1,312 yards)
  - Remote power feed through the system or (internal power via a 230V/42V battery (150 mA)
  - 256 IBS base stations is the maximum number handled by an OmniPCX Enterprise Communication Server
- Antenna
  - Built-in antenna
  - Connector for external antenna
  - Switched antenna diversity
- Environment
  - Operating temperature: +10°C to +40°C (+50°F to +104°F)
  - Environment protection: IP 20
  - Wall-mountable
- Number of users in the same cell
  - 2.8 Erlang/8379 DECT BS-two UA links can support up to 14 standard users per cell
  - Traffic handling based upon a standard user's traffic estimated at 0.2 Erlangs

3.3.6.2.2 Optimized outdoor base station (8379 DECT BS outdoor with external antennas)

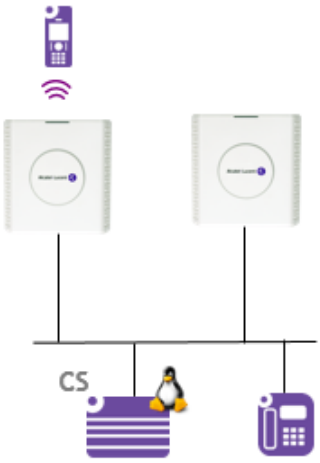
The 8379 DECT BS Outdoor with external antennas) is designed for outdoor use. The differences between 8379 DECT BS Integrated Antennas indoor and 8379 DECT BS Outdoor are:

- Remote power feeding only through the system
- External antenna
- Operating temperature: -20°C to +55°C (approx. -4°F to +131°F)
- Environment protection: IP 55

3.3.6.2.3 8378 DECT IP-xBS

The Alcatel-Lucent 8378 DECT IP-xBS provides a robust infrastructure for Digital Enhanced Cordless Telecommunications (DECT) in buildings and outdoors, to connect mobile workers everywhere. The unique radio tuning capabilities and on-air synchronization enable network coverage in most difficult areas to ensure excellent voice quality everywhere.

8378 DECT IP-xBS Base Station has been designed to offer DECT connectivity on IP/Ethernet networks.



All current DECT sets (8212, 8232, 8242, 8262 and 8262Ex) run with 8378 DECT IP-xBS.

The IP-xBS base stations pair with Alcatel-Lucent DECT handsets to deliver expert communication features (such as, dial-by-name and multi-line management) from ALE communication servers.

The 8378 IP-xBS powered solution offers cost-effective operations for all sizes of enterprise businesses. Excellent voice quality meets operational simplicity in small branches and large multi-site

companies with networked communication servers. The base stations leverage the IP network for voice do not require any IP network customization and are centrally managed by the communication servers.

8378 DECT IP-xBS handover and roaming capabilities extend the mobile coverage of TDM DECT networks, based on Alcatel-Lucent 4070 DECT Base Stations and 8379 DECT base stations. Investments in TDM DECT are preserved with IP-xBS base stations. They deliver quick return on investment, and seamless mobility for remote buildings, branch offices and refurbished floors.

Feature	Benefits
Over-the-air synchronization of base stations	Zero-touch deployment suitable for small businesses and large buildings
Support of AGAP and GAP protocols	Expert communications with AGAP including twinset with desktop phone, multi-line management, dial-by-name
Suitable for indoor and outdoor environments	Excellent voice quality everywhere
Built-in centralized management over IP with ALE communication servers	Cost-effective operations with 100% IP, or virtualized communication servers, without requiring IP multicast and additional servers or gateways
Radio tuning capabilities per base station and on air synchronization	DECT users can be reached in most challenging places such as staircases, U-shaped buildings, manufacturing, warehouses, and boats, among others

- **Handover and roaming capability with Alcatel-Lucent TDM DECT base stations** to preserve TDM investments and to offer fast ROI for all-IP buildings and branch offices
- Multi PARI compatibility (Up to 2032 base stations per installation) to have the right scalability to address very large campuses and networked buildings, i.e. hospital campus,
- Reservation of 2 Channels for alarms to ensure protection for people

Features Benefits

Mechanical characteristics	8378 IP-xBS
Dimensions (h x w x d)	Indoor (both models): 144x140x35 mm – 5,67x5.51x1.38 in. Outdoor box: 365x210x65 mm – 14.4x8.3x2.6 in.
Weight	Indoor integrated antennas: 295 g – 10.40 oz. Indoor for external antennas: 313 g – 11.04 oz. Outdoor: 1,10 Kg – 38.8 oz.
IP class	Indoor IP30, Outdoor box: IP55
Operating Temp.	Indoor (both models): +5 +45°C, +41 +113°F Outdoor: -20 +55°C +5 +131°F

Mounting	Mountable on wall & ceiling
Antennas	Integrated omnidirectional External (SMA connector)
IP connectivity	
PoE voltage	36-57V DC
PoE Class	Class 2
Power consumption	6,49W max
Local power feeding	Yes, optional PoE adaptor
IP Network	10/100Base-T, IEEE802.3
IP connector	RJ45
IP Cabling	Cat 5 UTP or better
IP version	IPv4
DHCP/TFTP support	Yes
DHCP option support	Option 12, 43, 58 (VLAN id), 60, 77
Static IP address / LLDP MED	supported
QoS	IEEE 802.1Q, IEEE 802.1P
Audio codecs	ITU-T G711 (A,µ), G729AB
Framing	20 ms
Branch Office support	Yes
Serviceability	LED status indication; Firmware downloadable through communication server; Communication server troubleshooting tool, air synchronization tree, statistics
DECT connectivity	
DECT Frequency bands	EMEA: 1880-1900 MHz Latin America: 1910-1930 MHz

	except Brazil 1910-1920 MHz North America: 1920-1930 MHz Asia: 1900-1906 MHz
Antenna	Integrated omnidirectional or SMA connector for external antenna
Sensitivity	Typical -90 dBm measured at antenna connection at BER=0.001
Range	Indoor typical: 20-50m Outdoor typical: 300m
DECT Protocol	GAP, AGAP (AGAP is encapsulated in UDP)
DECT Security	Identity, Authentication, Encryption
No. of simultaneous calls	11
Audio codec	G726
Maximum AP/system	Up to 2032 base stations
Mixed configurations (IP-xBS with IBS/RBS)	Supported possibility to mix with IBS/RBS (Roaming AND Handover)

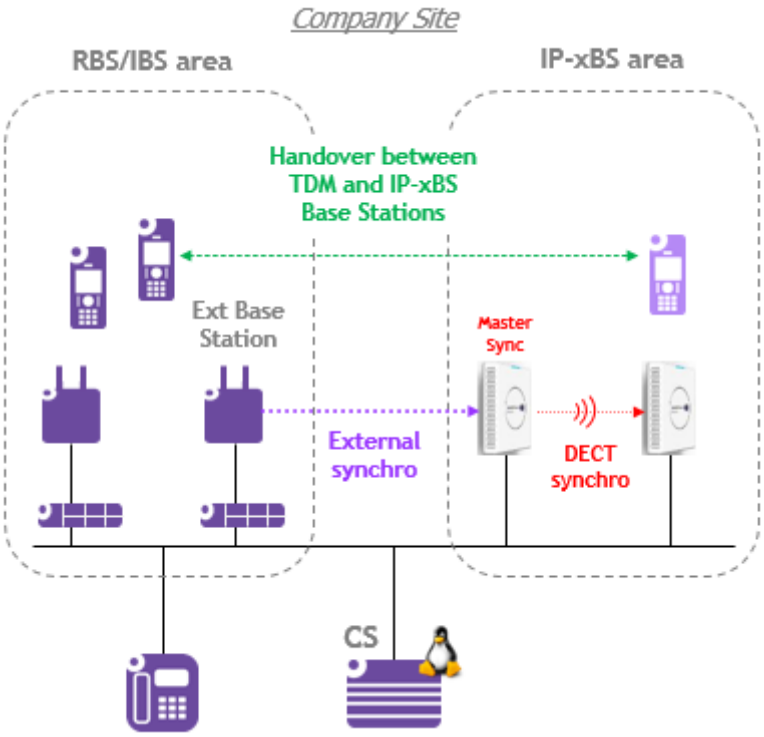
8378 DECT IP-xBS base stations **do not require any additional server for configuration**, administration and management.

3.3.6.2.4 Mix of TDM and IP xBS (IP DECT)

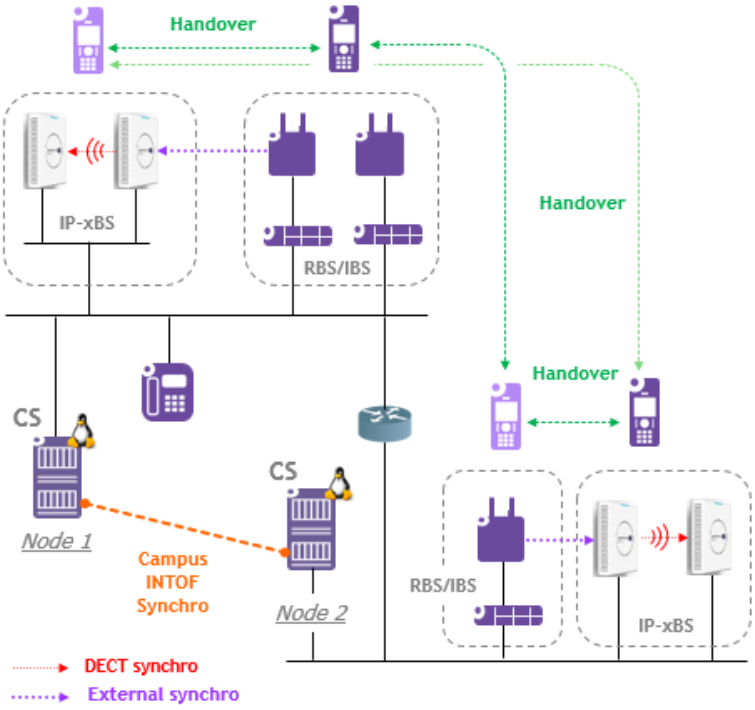
Both TDM and IP-xBS infrastructures can be mixed within the same Communication Server solution.

Due to the difference of technology, this kind of deployment is possible without coverage overlap. A remote site can be equipped with IP-xBS, even if other sites are deployed with a TDM infrastructure.

And TDM and IP_xBS infrastructures can be mixed within the same Communication Server solution.



This mixity is possible for the OmniPCX Enterprise DECT Campus (more than one OmniPCX Enterprise node with handover between nodes) service as well.



3.3.6.2.5 Comparison highlight TDM/IP-xBS

	OmniPCX Enterprise TDM DECT solution		**OmniPCX Enterprise IP-xBS solution**
	IBS	RBS	
Total AGAP DECT handsets	5000		1500
Pari number	1	8	1
Maximum APs	256	250 (1000 multi-PARI)	Up to 2032 natively
Simultaneous calls per AP	6	12	11
Roaming	YES	YES	YES
Handover	YES	YES	YES
Campus topology with high APs scalability	Managed by the OmniPCX Enterprise, thanks to "DECT Campus" feature (Up to 1000 base stations)		Managed by the OmniPCX Enterprise, thanks to "DECT Campus" feature
WW offer	YES	NO	YES

3.3.6.2.6 Gain antenna

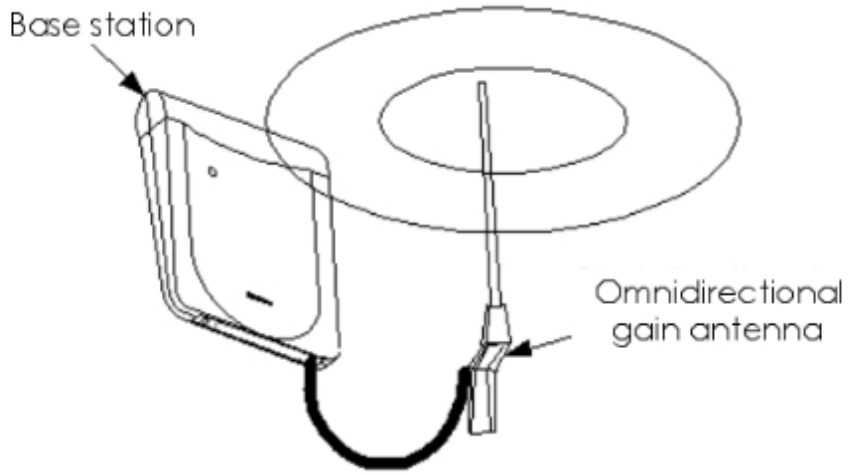
In certain instances, gain antennae may be useful to reduce the number of radio base stations which can entail a significant cost decrease. Gain antennae may reduce the number of base stations needed for outdoor coverage by a factor of three. They may be connected to a RBS or an IBS base station.

Two types of gain antennae are available:

- Omnidirectional antenna
- Directional antenna

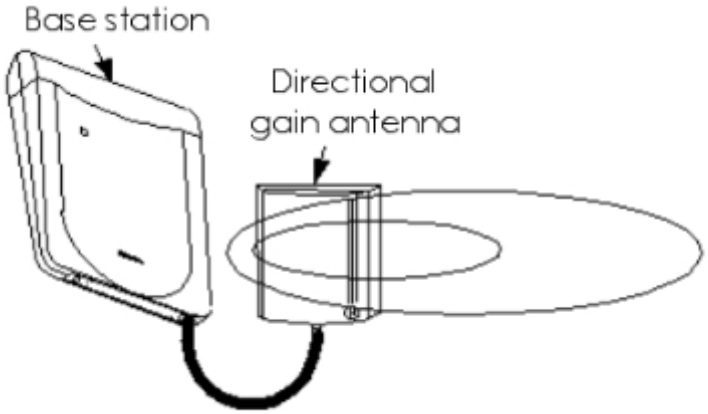
Omni directional antenna

This type of antenna is used in open areas (parking lots, sales areas) or in buildings with one floor.



Directional antenna

Directional gain antenna increases the radio signal in one specific direction.



3.3.6.2.7 8318 SIP DECT SINGLE base station

8318 SIP-DECT Single Base Station solution provides on-site mobility where users must be reachable anywhere in the office. The Alcatel-Lucent 8318 SIP-DECT Single Base Station solution includes one 8318 Single DECT base station with up to twenty 8212 DECT Handsets.

It gives users the freedom and mobility to move away from their desk within their office or adjacent offices. It provides an easily implemented mobility solution for small and medium business and enterprise markets.

SIP DECT is ideally suited for businesses seeking a voice and messaging capable on premise wireless solution for secure, quality voice performance that is lower cost, more robust to interference and easier to manage when compared to Wi-Fi or cellular solutions

In the retail segment, staff becomes reachable wherever they are and the use of objectionable overhead paging can be eliminated. The customer has a better chance of reaching the right person; the establishment becoming more responsive; all resulting in a more satisfying experience.

Main Features:

- DECT European frequencies
- 6 Slot radio with up to 5 voice channels
- 5 NB calls using G.726 / G711 (4 using G.729)
- 20 handsets registered
- Security: DECT security
- Mains power adaptor
- Centralized phonebook (csv, XML or LDAP)
- Multiline, Call groups, Backup server, …
- Auto provisioning

3.3.6.3 DECT telephone services

DECT Telephone Services features include:

Message notification

The display message icon lights when there is a message (text, voice mail, and unanswered call) waiting.

Text and voice messaging

The Alcatel-Lucent DECT handsets have access to the following services:

- Internal text message mailbox
- Number of new text messages
- Read, save content
- Answer or the sender back
- Send new messages (custom or standard messages and messages to be completed)
- Unanswered ISDN calls
- Number
- Read and save caller identity (ID)
- Callback

- Voice mailbox: direct access to the voice mailbox with DTMF mode automatically on (voice guidance).

Voice MAILBOX

Users have direct access to a voice mailbox with DTMF enabled by default (voice guidance).

Multi-line mode

The Alcatel-Lucent DECT handsets can operate as multiline sets. The second calling line appears as an icon.

Twinset service

Many employees have two phones:

- A wireless phone for use away from their desk
- A desktop phone with convenient user interface

To simplify the use of these two telephones, the OmniPCX Enterprise Communication Server supports the twin set feature, which allows to use either fixed and mobile telephones, transparently, as if they were the same sets.

Mobility in network

People who work at different company sites have access to the same level of communication and services as if they were working in their own office. This includes optional automatic call forwarding to an assistant, call screening, and user profiles (manager or assistant). Additional available services include:

- Voice mail: same level of service on a visited node as on the home node
- Voice mail notification and access
- Supervision: same level of service on a visited node as on the home node
- Callback request
- Callback on free requests are maintained when roaming
- Callback on busy requests are converted to callback on free when the phone moves onto another node
- Manager/assistant screening

In addition, the supervision feature makes it is possible to build up multi-site teams without relocating employees.

Visitor registration

Visitors (with or without their own mobile handset) may be registered as OmniPCX Enterprise Communication Server users. The OmniPCX Enterprise registers visitors with their first and last names, class of service, charging mode, connection class of service, cost center, and the handset IPUIN. The final registration date may also be defined. After this date, the handset is no longer authorized to make external calls. The registration process may be performed from the attendant console to enable quick configuration.

Overflow to a directory number

If a wireless phone does not answer when paged (switched off, out of coverage, etc.), the OmniPCX Enterprise Communication Server reroutes the call to a predefined directory number.

Miscellaneous

People, working in another part of company premises, benefit from the same level of services as if they were working in their offices. For example:

- Caller name identification
- Multi-line capability

- Notification with telephone icons
- Programmable keys
- Transparent access to all telephone services
- Object supervision
- Text messaging
- Voice mailbox
- Alarms

Conversation services

The DECT 8232/8242 handsets provide all of the following features:

- Call transfer
- Caller number/name display
- Callback
- Conferencing
- Mute
- Hang up
- Answer
- Waiting
- DTMF number sent
- Volume control
- Directory access
- Short-dialing keys
- Call diary (receive, lost, etc.)
- Enter / Leave a group line

END OF DOCUMENT

Uptime Institute (/)

Prêmios do Uptime Institute

DETALHES DO CLIENTE

ODATA

Odata SA

Fundada em junho de 2015, a Odata foi criada com o objetivo de fornecer toda a infraestrutura para abrigar servidores que processam informações com distribuição global. O core business da empresa é a prestação de serviços de colocation, ou seja, disponibilização de espaço físico adequado para armazenar grandes volumes de informações.

Local na rede Internet:

https://odatacolocation.com/ (https://odatacolocation.com/)

DETALHES DO PROJETO

Data Center SP01

Localização:
Santana de Parnaíba São Paulo, São Paulo, Brasil

PRÊMIOS

TIER III DESIGN®
Odata Data Center
SP01, Phase 1A & 1B
Expires 28 March 2019
UPTIME INSTITUTE CERTIFIED

São Paulo, 11 de março de 2022

DECLARAÇÃO

Declaramos para os devidos fins que a empresa **3CORP TECHNOLOGY INFRAESTRUTURA DE TELECOM LTDA,** com matriz estabelecida na **Alameda Oceania, nº 56 – Polo Empresarial, Tamboré, Santana de Parnaíba/SP – CEP: 06.543-308,** sob o CNPJ/MF sob o nº **04.238.297/0001-89,** incluindo suas filiais sob o **CNPJ/MF** nº **04.238.297/0004-21** e **04.238.297/0007-74,** é cliente da nossa companhia, e que hospeda diversas tecnologias, tais como: Networking e Segurança (Switches, Firewall, WLAN, Roteadores), Omnichannel, Call Centere Telefonia em nuvem (PABX), em nosso Data Center ("DC-SP01"), localizado no endereço Estrada dos Romeiros, 943 – Votuparim, CEP: 06513-001 – Santana de Parnaíba – SP, que possuí a certificação Tier III em Design e Facility, certificações que possuem associação ao conceito da norma ANSI/TIA-942.

Essa declaração é válida até 31 de dezembro de 2022

Atenciosamente,

_____

ODATA SP 01 S.A.

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Eventos do documento

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RONALDO GONÇALVES TIAGO **Aprovou** (cf90c68a-31fd-442d-8051-7b60bc69ff29) - Email: ronaldo.tiago@odata.com.br - IP: 45.7.232.46 (45.7.232.46 porta: 2426) - Geolocalização: -23.5926189 -46.6802014 - Documento de identificação informado: 201.321.076-00 - DATE_ATOM: 2022-03-15T10:41:52-03:00

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LOCALIDADE	ENDEREÇO	DDD	ESTIMADA	ESTIMADA DE	total de DIDS	LINK BL OU DEDICADO	ACESSO	CRONOGRAMA PRELIMINAR
Angra dos Reis	Rua Coronel Carvalho, 230 Centro, Angra dos Reis, RJ, 23900315	24	20	39	59	200 MBPS	FIBRA GPON	19/dez
Araruama	Av. Nilo Peçanha, 259 Centro, Araruama, RJ, 28970000	22	20	37	57	200 MBPS	FIBRA GPON	19/dez
Armação de Buzios	Luiz Joaquim Pereira, 228 Centro, Armação dos Búzios, RJ, 28950000	22	2	8	10	200 MBPS	FIBRA GPON	19/dez
Arraial do Cabo	Rua Raimundo Ottoni Castro de Maia, 104 Prainha, Arraial do Cabo,	22	4	7	11	200 MBPS	FIBRA GPON	19/dez
Barra do Piraí	Rua José Alves Pimenta, 1221 Matadouro, Barra do Piraí, RJ,	24	12	29	41	200 MBPS	FIBRA GPON	19/dez
Barra Mansa	Avenida Argemiro de Paula Coutinho, 2000 Centro, Barra Mansa, RJ,	24	25	39	64	200 MBPS	FIBRA GPON	19/dez
Barra Mansa	Rua Oscar da Silva Marins, 155 B Centro, Barra Mansa, RJ, 27310200	24	4	10	14	200 MBPS	FIBRA GPON	19/dez
Belford Roxo	Rua Manicoré, 102 , São Bernardo, Belford Roxo, RJ, 26167000	21	32	49	81	300 MBPS	FIBRA GPON	19/dez
Bom Jardim	Praça Governador Roberto Silveira, 136 Centro, Bom Jardim, RJ,	22	3	6	9	200 MBPS	FIBRA GPON	19/dez
Bom Jesus de Itabapoana	Avenida Olímpica, 478 Centro, Bom Jesus do Itabapoana, RJ,	22	5	5	10	200 MBPS	FIBRA GPON	19/dez
Brasília-DF	Setor SAFS Quadra 2, s/nº Zona Cívico-Administrativa, Brasília, DF,	61	3	9	12	200 MBPS	FIBRA GPON	19/dez
Cabo Frio	Praça Porto Rocha, 8 Centro, Cabo Frio, RJ	22	9	14	23	200 MBPS	FIBRA GPON	19/dez
Cabo Frio	Rua Ministro Gama Filho, s/nº Braga, Cabo Frio, RJ, 28908090	22	13	36	49	200 MBPS	FIBRA GPON	19/dez
Cachoeiras de Macacu	de Macacu, RJ,	22	4	7	11	200 MBPS	FIBRA GPON	19/dez
Cachoeiras de Macacu	Rua Dalmo Coelho Gomes, 1 Betel, Cachoeiras de Macacu, RJ,	22	7	18	25	200 MBPS	FIBRA GPON	19/dez
Cambuci	Rua Maria Jacob, 134 Centro, Cambuci, RJ, 28430000	22	3	5	8	200 MBPS	FIBRA GPON	19/dez
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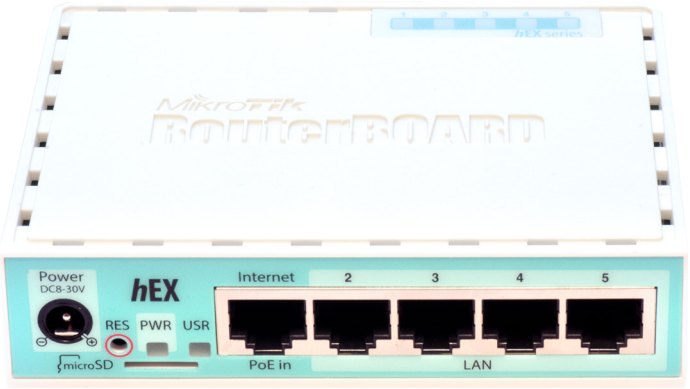
Eng. Paulo de Frontin	Rod. Luciano Medeiros, 568 - Santo Antonio da Provisoria, Eng. Paulo de Frontin - RJ, 266	24	3	4	7	200 MBPS	FIBRA GPON	19/dez
Guapimirim	Estrada Imperial, s/nº Bananal, Guapimirim, RJ, 25940000	21	10	10	20	200 MBPS	FIBRA GPON	19/dez
Iguaba Grande	Rua Hilário Gomes de Souza, 1465 Parque Tamaris, Iguaba Grande,	22	4	7	11	200 MBPS	FIBRA GPON	19/dez
Itaboraí	Avenida Vereador Hermínio Moreira, s/nº Sossego, Itaboraí, RJ,	21	28	40	68	200 MBPS	FIBRA GPON	19/dez
Itaguaí	Rua General Bocaiúva, 254 Centro, Itaguaí, RJ, 23815310	21	20	16	36	200 MBPS	FIBRA GPON	19/dez
Italva/Cardodo	Rua Aristides Gonçalves de Souza, 86 São Caetano, Italva, RJ,	22	3	5	8	200 MBPS	FIBRA GPON	19/dez
Itaocara	R. Amaro - Jardim D Aldeia, Itaocara - RJ, 28570-000	22	1	8	9	200 MBPS	FIBRA GPON	19/dez
Itaocara	Rua Joaquim Soares Monteiro 01, 1 Loteamento Recreio, Itaocara,	22	4	8	12	200 MBPS	FIBRA GPON	19/dez
Itaperuna	Rodovia, BR 356 s/n km 01 Centro Itaperuna Cep 28300-000	22	4	27	31	200 MBPS	FIBRA GPON	19/dez
Itaperuna	Rua Padre João Batista, 172 Cidade Nova, Itaperuna, RJ, 28300000	22	5	10	15	200 MBPS	FIBRA GPON	19/dez
Itatiaia	Rua Antônio Gomes de Macedo, 156 Centro, Itatiaia, RJ, 27580000	24	3	7	10	200 MBPS	FIBRA GPON	19/dez
Japeri	Rua Vereador Francisco Costa Filho, s/nº Engenheiro Pedreira, Japeri,	21	4	9	13	200 MBPS	FIBRA GPON	19/dez
Laje do Muriaé	Rua Ademar Ligiero, 36 Centro, Laje do Muriaé, RJ, 28350000	22	3	5	8	200 MBPS	FIBRA GPON	19/dez
Macaé	Rodovia Christino José da Silva Júnior, 165 KM 4 Virgem Santa,	22	30	114	144	300 MBPS	FIBRA GPON	19/dez
Magé	Avenida Santos Dumont, s/nº Parque Santana (Vila Inhomirim),Magé, RJ, 25937192	21	6	16	22	200 MBPS	FIBRA GPON	19/dez
Magé	Rua Doutor Domingos Belizze, 236 Centro, Magé, RJ, 25900058	21	15	28	43	200 MBPS	FIBRA GPON	19/dez
Mangaratiba	Estr. São João Marcos, sn - Praia Do Saco, Mangaratiba - RJ, 23860-000	21	4	8	12	200 MBPS	FIBRA GPON	19/dez
Maricá	Rua Álvares de Castro, 1.125 Centro, Maricá, RJ, 24900880	21	20	32	52	200 MBPS	FIBRA GPON	19/dez
Mendes	Rua Alberto Torres, 114 Centro, Mendes, RJ, 26700000	24	5	7	12	200 MBPS	FIBRA GPON	19/dez
Mesquita	Rua Paraná, 01 Centro, Mesquita, RJ, 26553020	21	12	23	35	200 MBPS	FIBRA GPON	19/dez
Miguel Pereira	Rua Francisco Alves, 105 Centro, Miguel Pereira, RJ, 26900000	24	3	6	9	200 MBPS	FIBRA GPON	19/dez
Miracema	Avenida Deputado Luiz Fernando Linhares, 1020 Centro, Miracema,RJ, 28460000	22	5	13	18	200 MBPS	FIBRA GPON	19/dez
Natividade	Rua Int Franklin Rabelo, 8 Centro, Natividade, RJ, 28380000	22	3	6	9	200 MBPS	FIBRA GPON	19/dez
Nilópolis	Avenida Getúlio Vargas, 571 Centro, Nilópolis, RJ, 26510013	21	21	36	57	200 MBPS	FIBRA GPON	19/dez
Niterói	Estrada Caetano Monteiro, s/nº Badu, Niterói, RJ, 24320570	21	6	16	22	200 MBPS	FIBRA GPON	19/dez
Niterói	Praça Fonseca Ramos, s/nº Centro, Niterói, RJ, 24030020	21	5	10	15	200 MBPS	FIBRA GPON	19/dez
Niterói	R. Reverendo Armando Ferreira, nº 350 Lj - Shopping do Largo -Largo da Batalha	21	4	11	15	200 MBPS	FIBRA GPON	19/dez
Niterói	Rua Coronel Gomes Machado, s/nº Centro, Niterói, RJ, 24020067	21	18	56	74	300 MBPS	FIBRA GPON	19/dez

Niterói	Rua Visconde de Sepetiba, 519 Centro, Niterói, RJ, 24012900	21	10	35	45	200 MBPS	FIBRA GPON	19/dez
Nova Friburgo	Rua General Osório, 284 Centro, Nova Friburgo, RJ, 28625630	22	35	63	98	300 MBPS	FIBRA GPON	19/dez
Nova Iguaçu	Avenida Doutor Mário Guimarães, 968 Centro, Nova Iguaçu, RJ,26255230	21	36	92	128	300 MBPS	FIBRA GPON	19/dez
Paracambi	Rua Alberto Leal Cardoso, 92 Centro, Paracambi, RJ, 26600000	21	4	10	14	200 MBPS	FIBRA GPON	19/dez
Paraíba do Sul	Rua Marquês de São João Marcos, 21 Centro, Paraíba do Sul, RJ,25850000	24	2	13	15	200 MBPS	FIBRA GPON	19/dez
Paraty	Rua Santa Rita, 208 Centro (Paraty), Parati, RJ, 23970000	24	5	8	13	200 MBPS	FIBRA GPON	19/dez
Paty dos Alferes	Praça George Jacob Abdue, s/nº Centro, Paty do Alferes, RJ,26950000	24	4	9	13	200 MBPS	FIBRA GPON	19/dez
Petropolis	Avenida Barão do Rio Branco, 2001 Centro, Petrópolis, RJ, 25680275	24	25	40	65	200 MBPS	FIBRA GPON	19/dez
Petrópolis	Av. Barão do Rio Branco, s/nº Forum - Centro	24	10	40	50	200 MBPS	FIBRA GPON	19/dez
Petrópolis	Estrada União e Indústria, 11860 Itaipava, Petrópolis, RJ, 25730745	24	6	10	16	200 MBPS	FIBRA GPON	19/dez
Petrópolis	Estrada União e Indústria, 9900 Itaipava, Petrópolis, RJ, 25730735	24	7	20	27	200 MBPS	FIBRA GPON	19/dez
Petrópolis	Rua Doutor Nelson de Sá Earp, 254 Centro, Petrópolis, RJ, 25680195	24	12	19	31	200 MBPS	FIBRA GPON	19/dez
Pinheiral	Rua Benedito Honorato, 287 Paraíso, Pinheiral, RJ, 27197000	24	4	8	12	200 MBPS	FIBRA GPON	19/dez
Piraí	Avenida Beira Rio, 331 Centro, Piraí, RJ, 27175000	22	3	7	10	200 MBPS	FIBRA GPON	19/dez
Porciúncula	Rua Sebastião Rodrigues França, 100 Centro, Porciúncula, RJ,28390000	22	2	8	10	200 MBPS	FIBRA GPON	19/dez
Porto Real	Rua 04, 76 Centro, Porto Real, RJ, 27570000	24	3	5	8	200 MBPS	FIBRA GPON	19/dez
Queimados	Rua Otilia, 210 Vila do Tinguá, Queimados, RJ, 26383290	21	9	21	30	200 MBPS	FIBRA GPON	19/dez
Resende	Avenida Marcílio Dias, 182 Liberdade, Resende, RJ, 27510080	24	12	24	36	200 MBPS	FIBRA GPON	19/dez
Rio Bonito	Av. Antônio Carlos Guadelupe, s/n - Green Valley, Rio Bonito - RJ,28800-000	21	11	14	25	200 MBPS	FIBRA GPON	19/dez
Rio Claro	Rua Manoel Portugal, 156 Centro, Rio Claro, RJ, 27460000	24	3	8	11	200 MBPS	FIBRA GPON	19/dez
Rio das Flores	R. João Carvalho da Rocha, 268 - Centro, Rio das Flores - RJ, 27660-000	24	2	3	5	200 MBPS	FIBRA GPON	19/dez
Rio das Ostras	Alameda Desembargador Ellis Hermidyo Figueira, 1999 JardimCampomar, Rio das	22	9	18	27	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Av. Erasmo Braga, 115 - Centro, Rio de Janeiro - RJ, 20020-903	21	25	49	74	300 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Av. Ernani Cardoso, 152 - Cascadura, Rio de Janeiro - RJ, 21310-290	21	7	51	58	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Av. Paisagista José Silva de Azevedo Neto - Barra da Tijuca, Rio de	21	5	6	11	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Av. Rodrigues Alves, 731 - Santo Cristo, Rio de Janeiro - RJ, 20220-	21	2	6	8	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Av. Srg. de Milícias, s/n - Pavuna, Rio de Janeiro - RJ, 21532-290	21	10	20	30	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Avenida Erasmo Braga, 115 Centro, Rio de Janeiro, RJ, 20020903	21	52	49	101	300 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Avenida Ernani Cardoso, 152 Cascadura, Rio de Janeiro, RJ,21310310	21	30	51	81	300 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Avenida Ernani Cardoso, 152 Cascadura, Rio de Janeiro, RJ,21310310	21	10	51	61	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Avenida Luís Carlos Prestes, s/nº Barra da Tijuca, Rio de Janeiro, RJ,22775055	21	4	55	59	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Avenida Marechal Câmara, 271 Centro, Rio de Janeiro, RJ, 20020080	21	124	103	227	LINK DEDICADO 100M	FIBRA	09/jan
Rio de Janeiro	Avenida Marechal Câmara, 314 Centro, Rio de Janeiro, RJ, 20020080	21	324	409	733	LINK DEDICADO 100M	FIBRA	09/jan
Rio de Janeiro	Avenida Marechal Fontenelle, 3545 Jardim Sulacap, Rio de Janeiro, RJ,21750000	21	5	18	23	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Avenida Maria Teresa, 75 Campo Grande, Rio de Janeiro, RJ,	21	42	87	129	300 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Avenida Monsenhor Félix, 512 Irajá, Rio de Janeiro, RJ, 21235110	21	8	10	18	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Avenida Nilo Peçanha, 12 Centro, Rio de Janeiro, RJ, 20020100	21	72	90	162	300 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Avenida Padre Leonel Franca, 248 Gávea, Rio de Janeiro, RJ,	21	2	11	13	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Avenida Padre Leonel Franca, 248 Gávea, Rio de Janeiro, RJ,	21	2	11	13	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Avenida Rio Branco, 147 Centro, Rio de Janeiro, RJ, 20040006	21	124	239	363	LINK DEDICADO 100M	FIBRA	09/jan
Rio de Janeiro	Avenida Rodrigues Alves, 731 Saúde, Rio de Janeiro, RJ, 20220360	21	2	6	8	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Avenida Sargento de Milícias, s/nº Pavuna, Rio de Janeiro, RJ,21532290	21	10	20	30	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Estrada do Gabinal, 313 Freguesia (Jacarepaguá), Rio de Janeiro, RJ,	21	3	4	7	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Praça Jesuíno Ventura, s/nº Anchieta, Rio de Janeiro, RJ, 21625230	21	7	14	21	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Praia da Olaria - Cocotá, Rio de Janeiro - RJ, 25804-120	21	5	33	38	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Praia da Olaria, s/nº Cocotá, Rio de Janeiro, RJ, 21910295	21	25	33	58	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	R. Filomena Nunes, 1071 - Olaria, Rio de Janeiro - RJ, 21021-380	21	4	60	64	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rio de Janeiro, RJ,	21	5	18	23	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Assunção, 501 Botafogo, Rio de Janeiro, RJ, 22251030	21	2	2	4	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Berta Lutz, 85 Gávea, Rio de Janeiro, RJ, 22450290	21	4	10	14	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Carlos da Silva Costa, 118 Campo Grande, Rio de Janeiro, RJ,	21	4	2	6	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Conde de Bonfim, 255 Tijuca, Rio de Janeiro, RJ, 20520051	21	2	2	4	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua da Assembléia, 77-A Centro, Rio de Janeiro, RJ, 20011001	21	3	17	20	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Daniel, 84 Cidade de Deus, Rio de Janeiro, RJ, 22763530	21	3	0	3	200 MBPS	FIBRA GPON	19/dez

Rio de Janeiro	Rua do Ouvidor, 90 Centro, Rio de Janeiro, RJ, 20040030	21	30	25	55	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Doze de Fevereiro, s/nº Bangu, Rio de Janeiro, RJ, 21810052	21	4	9	13	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Filomena Nunes, 1071 Olaria, Rio de Janeiro, RJ, 21021380	21	30	60	90	300 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Glaziou, 68 Pilares, Rio de Janeiro, RJ, 20750010	21	10	14	24	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Humberto de Campos, 315 Leblon, Rio de Janeiro, RJ, 22430190	21	12	9	21	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Lucena, s/nº Olaria, Rio de Janeiro, RJ, 21021320	21	12	21	33	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Medeiros e Albuquerque, 82 Santa Cruz, Rio de Janeiro, RJ,	21	6	46	52	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Moura Brasil, 23 Laranjeiras, Rio de Janeiro, RJ, 22231200	21	5	9	14	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Olavo Bilac, s/nº Santa Cruz, Rio de Janeiro, RJ, 23570220	21	3	4	7	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Padre Ventura, 50 Taquara, Rio de Janeiro, RJ, 22710266	21	12	16	28	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Professora Francisca Piragibe, 151 Taquara, Rio de Janeiro, RJ	21	20	38	58	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Professora Francisca Piragibe, 80 Taquara, Rio de Janeiro, RJ,	21	30	34	64	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Santa Fé, 42/50 Méier, Rio de Janeiro, RJ, 20775065	21	62	113	175	LINK DEDICADO 100M	FIBRA	09/jan
Rio de Janeiro	Rua São José, 35 Centro, Rio de Janeiro, RJ, 20010020	21	304	461	765	LINK DEDICADO 100M	FIBRA	09/jan
Rio de Janeiro	Rua São Luiz Gonzaga, 107 São Cristóvão, Rio de Janeiro, RJ,	21	5	12	17	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Senador Furtado, 08, 1º andar Maracanã, Rio de Janeiro, RJ,	21	2	2	4	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Sete de Setembro, 32 Centro, Rio de Janeiro, RJ, 20050009	21	48	225	273	LINK DEDICADO 100M	FIBRA	09/jan
Rio de Janeiro	Rua Silva Cardoso, 198 Bangu, Rio de Janeiro, RJ, 21810032	21	30	65	95	300 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Siqueira Campos, 143-D Copacabana, Rio de Janeiro, RJ,22031900	21	2	1	3	200 MBPS	FIBRA GPON	19/dez
Rio de Janeiro	Rua Teodoro da Silva, 336, Vila Isabel, Rio de janeiro, RJ, 20560-001	21	8	19	27	200 MBPS	FIBRA GPON	19/dez
S. Francisco de Itabapoana	Praça dos Três Poderes, s/nº Centro, São Francisco de Itabapoana,	24	10	5	15	200 MBPS	FIBRA GPON	19/dez
S. J. do Vale do Rio	Rua Senhor dos Passos, 37 Centro, São José do Vale do Rio Preto,	24	10	6	16	200 MBPS	FIBRA GPON	19/dez
Santa Maria	Madalena, RJ,	22	2	4	6	200 MBPS	FIBRA GPON	19/dez
Santo Antônio de	End.: Av. João Josbick, s/nº Aeroporto, Santo Antônio de Pádua, RJ,	22	10	19	29	200 MBPS	FIBRA GPON	19/dez
São Fidélis	Rua Guaraciaba, 245 Centro, São Fidélis, RJ, 28400000	22	5	12	17	200 MBPS	FIBRA GPON	19/dez
São Gonçalo	Rua Doutor Francisco Portela, 2775 Patronato, São Gonçalo, RJ,	21	25	29	54	200 MBPS	FIBRA GPON	19/dez
São Gonçalo	Travessa Judith, 208 Barro Vermelho, São Gonçalo, RJ, 24416200	21	37	66	103	300 MBPS	FIBRA GPON	19/dez
São João da Barra	Rua do Sacramento, 223 Centro, São João da Barra, RJ, 28200000	22	5	10	15	200 MBPS	FIBRA GPON	19/dez
São João de Meriti	Avenida Presidente Lincoln, 899 Jardim Meriti, São João de Meriti, RJ,	21	8	16	24	200 MBPS	FIBRA GPON	19/dez
São João de Meriti	Avenida Presidente Lincoln, 911 Jardim Meriti, São João de Meriti, RJ,	21	30	55	85	300 MBPS	FIBRA GPON	19/dez
São Pedro da Aldeia	Rua Antônio Benedito Siqueira, s/nº Centro, São Pedro da Aldeia, RJ,	22	8	16	24	200 MBPS	FIBRA GPON	19/dez
São Sebastião do Alto	Rua Dr. Eurico Cerbino, 51 Centro, São Sebastião do Alto, RJ,	22	2	3	5	200 MBPS	FIBRA GPON	19/dez
Sapucaia	Praça Barão de Ayuroca, 75 Centro, Sapucaia, RJ, 25880000	24	3	5	8	200 MBPS	FIBRA GPON	19/dez
Saquarema	Praça Santos Dumont, 15 Centro, Saquarema, RJ, 28990000	22	5	10	15	200 MBPS	FIBRA GPON	19/dez
Seropédica	Antiga Estrada Rio São Paulo, Km 41, 310 Jardins, Seropédica, RJ,	21	8	15	23	200 MBPS	FIBRA GPON	19/dez
Silva Jardim	Rua Luis Gomes, 415 Centro, Silva Jardim, RJ, 28820000	22	3	6	9	200 MBPS	FIBRA GPON	19/dez
Sumidouro	Praça Getúlio Vargas, 61 Centro, Sumidouro, RJ, 28637000	22	3	7	10	200 MBPS	FIBRA GPON	19/dez
Teresópolis	Rua Rui Barbosa, 662, Várzea - Teresópolis	22	35	92	127	300 MBPS	FIBRA GPON	19/dez
Trajano de Morais	Av. Castelo Branco, s/nº Centro, Trajano de Moraes, RJ, 28750000	22	2	3	5	200 MBPS	FIBRA GPON	19/dez
Três Rios	Rua Duque de Caxias, 297 Centro, Três Rios, RJ, 25802120	24	20	29	49	200 MBPS	FIBRA GPON	19/dez
Valença	Rua Padre Luna, 99 Centro, Valença, RJ, 27600000	24	12	28	40	200 MBPS	FIBRA GPON	19/dez
Vassouras	Avenida Marechal Paulo Torres, 731 Centro, Vassouras, RJ,	24	5	11	16	200 MBPS	FIBRA GPON	19/dez
Volta Redonda	Rua Desembargador Ellis Hermydio Figueira, 194 Aterrado, VoltaRedonda, RJ,	24	10	55	65	200 MBPS	FIBRA GPON	19/dez
Volta Redonda	Rua Sete de Setembro, 300 Aterrado, Volta Redonda, RJ, 27213160	24	18	24	42	200 MBPS	FIBRA GPON	19/dez

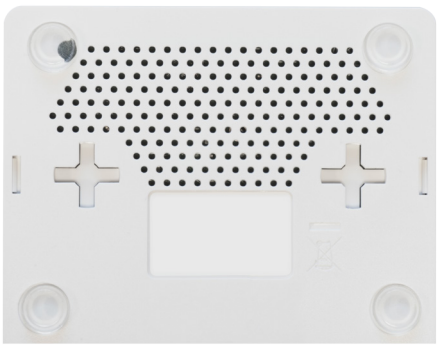
hEX

hEX is a five port gigabit ethernet router for locations where wireless connectivity is not required. The device has a USB 2.0 port. This new updated revision of the hEX brings several improvements in performance.



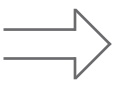
- hEX (revision 3)
- 880 MHz CPU, 2 cores and 4 threads
- 256 MB RAM
- microSD slot for “Dude Server” support
- Full size USB
- IPsec hardware acceleration ~450 Mbps
- Same form factor
- Same price

It is affordable, small and easy to use, but at the same time comes with a very powerful dual core 880MHz CPU and 256MB RAM, capable of all the advanced configurations that RouterOS supports. IPsec Hardware encryption (~450Mbps) and dude server package is supported, microSD slot on it also provides improved r/w speed for database storage on microSD card.



Performance comparison

Previous r2	64 byte	1518 byte	1400 byte
Bridging	396 Mbps	986 Mbps	986 Mbps
Routing	373 Mbps	986 Mbps	986 Mbps
AES-128	9 Mbps	52 Mbps	50 Mbps



New r3	64 byte	1518 byte	1400 byte
Bridging	**523 Mbps**	**1972 Mbps**	**1972 Mbps**
Routing	**530 Mbps**	**1972 Mbps**	**1972 Mbps**
AES-128	**21 Mbps**	**472 Mbps**	**450 Mbps**

Specifications

Product code	RB750Gr3
CPU nominal frequency	880 MHz
CPU core count	2
Size of RAM	256 MB
10/100/1000 Ethernet ports	5
PoE in	Yes
Supported input voltage	8 - 30 V
PCB temperature monitor	Yes
Voltage Monitor	Yes
USB	Yes, type A 2.0
Hardware encryption	Yes
Dude server package support	Yes
Dimensions	113x89x28mm
License level	4
Operating System	RouterOS
CPU	MT7621A
Max Power consumption	5 W
Suggested price	$59.95

Included

24V 0.38A Power adapter

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CLIENT DETAILS

VIVO S.A.

Vivo S.A. is engaged in the provision of mobile telecommunication services. The company was formerly known as Global Telecom S.A. Vivo S.A. was founded in 1972 and is based in Londrina, Brazil.

Website:

http://www.vivo.com.br/ (http://www.vivo.com.br/)

PROJECT DETAILS

Data Center Tambore

Local:
Sao Paulo SP, SP, Brazil

PRÊMIOS

TIER III DESIGN™
Vivo S. A.
Data Center Tambore
February 14, 2011
UPTIME INSTITUTE CERTIFIED

TIER III FACILITY™
Vivo S.A.
Data Center Tambore
January 19, 2012
UPTIME INSTITUTE CERTIFIED

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