Voice Over IP, IN, VPN and the PBX

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VoIP,
INP VPN,
PBX,
virtual contrex

This paper analyses the impact of Voice over IP (VoIP) on the PBX. We consider two key drivers of media convergence and service execution convergence, and show how VoIP is a discontinuity that is set to have a big impact on both these drivers. We go on to analyse the likely impact of VoIP in a typical SME business segment, and show scenarios for deployment. We then look at the impact of these on the PBX itself. Finally, we examine the area of open services, and the interoperability of the computing platforms that provide them (such as IN, PBX, etc.)

Voice over IP,

IN, VPN, and the PBX

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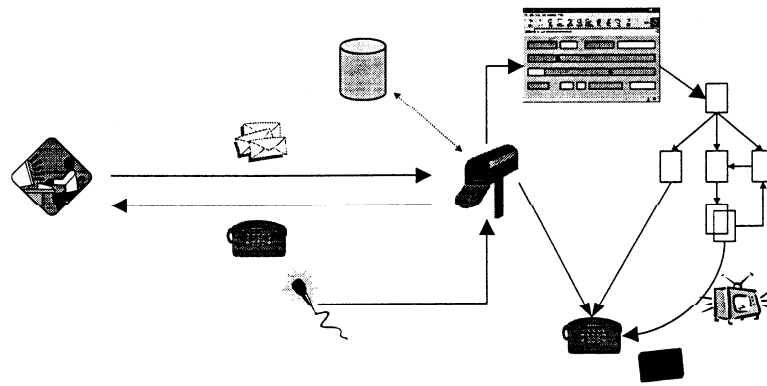
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(Lack of) Media Convergence
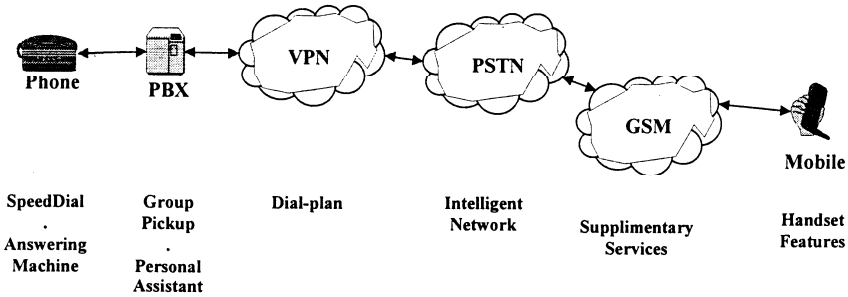

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Why can't I...

•Reply to an email via a telephone call

•Reply to a voicemail via a telephone call

•Have a single set of mailing lists

•Record all my telephone calls (have a simple autodelete of old ones)

•View and manipulate my voice media

    •See who's speaking when

    •Size of message

    •Delete/Play/Annotate/Hyperlink/Drag and Drop segments

•Keep all my communication media as linked hypermedia

•Access my mailbox via phone and have my email read to me

•Access the Web by phone (IWR/IVR)

    •Have pages read out to me

    •Follow hyperlinks and click on buttons (e.g. 'call me!')

•Have urgent web-push content delivered via Phone or Pager

(Lack of) Service Convergence

SpeedDial	Group Pickup	Dial-plan	Intelligent Network		Handset Features
Answering Machine	Personal Assistant			Supplimentary Services	

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For a simple call there are many places services can be provided.

They're all developed, rolled out, billed and managed separately.

This situation is much worse when multilple operators are involved (e.g. roaming, LEC & IXC etc).

What's Required...

Open Solutions...

...where Services are linked to

Customers not *Technologies*
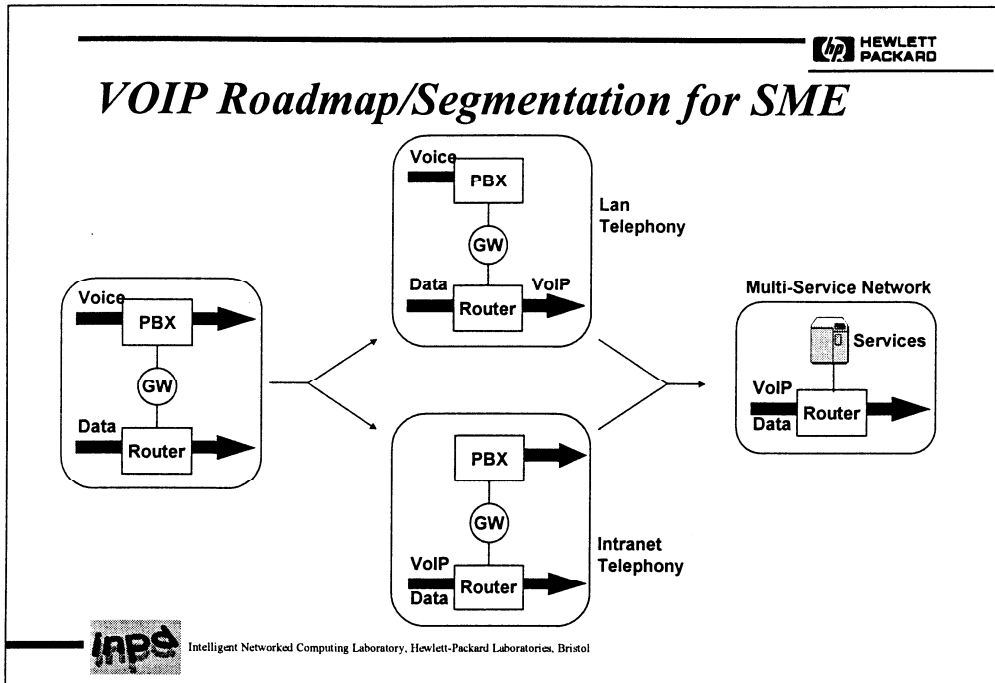
And where all *Media* are *Integrated*

Opening up the
Service Architecture

Voice over IP is a driver
for both these

Integrating Media

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Development of Small-Medium Enterprise with VoIP.

VoIP is poor over open Inernet, but works over a managed IP network. Gateways translate voice between the two domains.

(Left) Separate Voice and Data networks as normal, but an H.323 POTS to IP Gateway has been added, leading to one of the next two pictures.

(Top) Here voice is delivered over IP inside the SME, i.e. Lan Telephony. PC's are used as phones, thus a paradigm shift is required. All voice wiring etc dissapears, and PBX functions concerned with driving phones dissapear. This has a major impact on the nature of the PBX, since it now handles just trunks and provides services. Driver is thus vastly reduced capital equipment costs.

(Bottom) Here voice is delivered over IP outside/between the SME i.e. Intranet Telephony. Driver is cheap intra-company phone calls on the Intranet. Requires very little change to infrastructure. However, it's mainly a bearer channel replacement, and offers few extra service possibilities.

(Right) Voice is over IP is used throughout, and services are now provided separately.
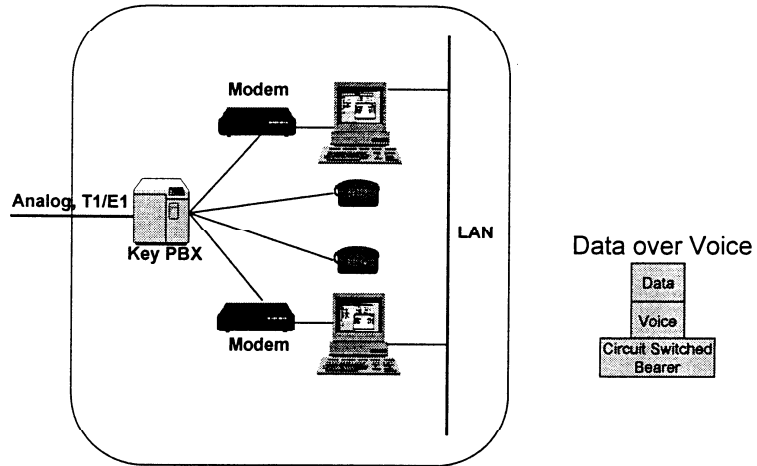
SME Phase 1: Voice Only
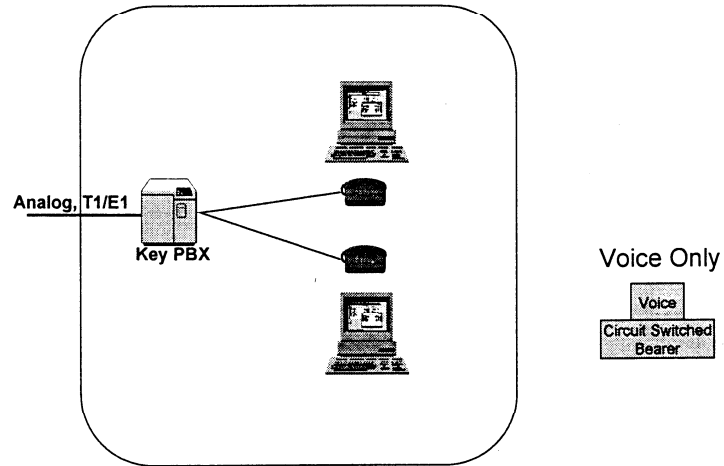
This is starting point: an enterprise with Voice only.

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SME Phase 2: Voice (+ Data)

Now they have some data requirements, so they get a LAN and some
modems for dial-up ISP access. Here they have a small amount of data, so
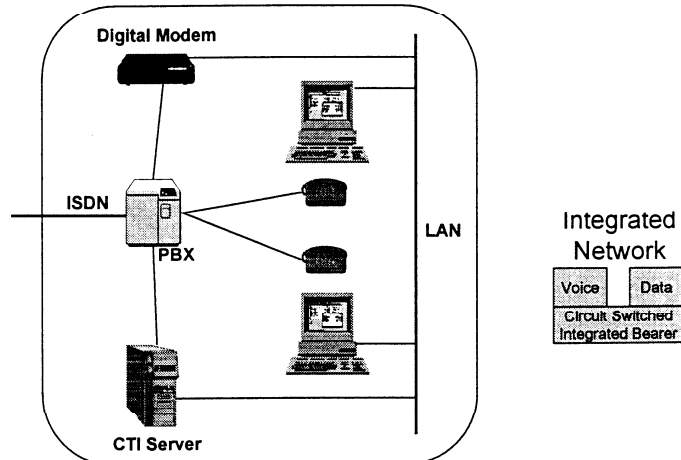they run it iver their exisitng voice network.

SME Phase 3: Voice + Data

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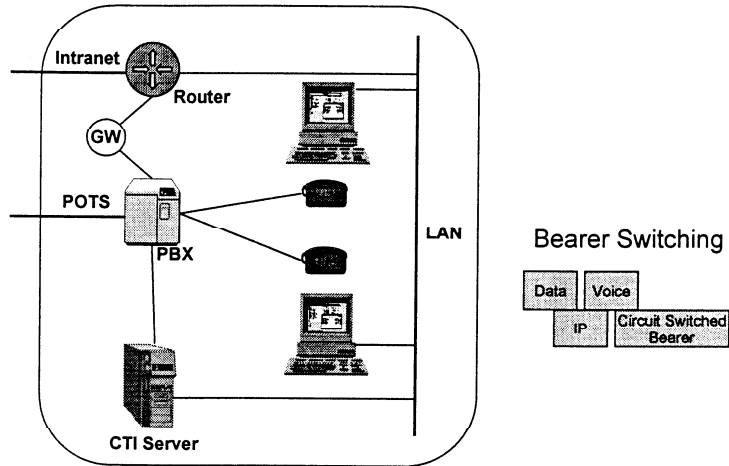
Now their data requirements grow again, so they move to a digital modem to avoid the problems of one modem per PC.

They also start to get some CTI capabilities.

This can be viewed as a migration of services out of the PBX; or as a CTI server as the evolution of the PBX.

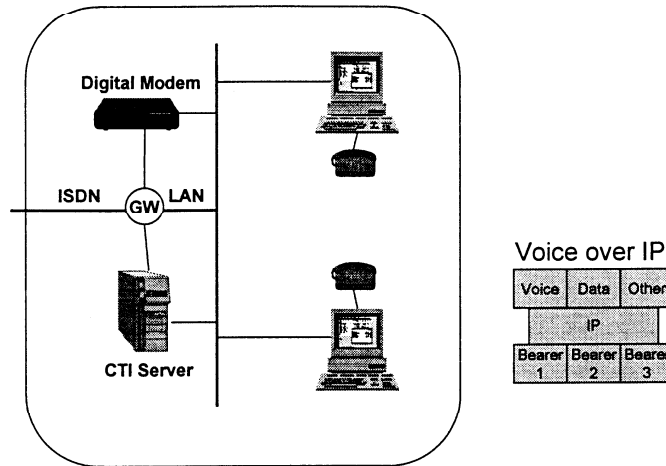Now they are at the 'fork in the path' as to how to implement VoIP.

SME Phase 4a: Data + Voice

HEWLETT PACKARD

Intranet
Router
GW
POTS
PBX
LAN
CTI Server

Bearer Switching

| Data | Voice |
| IP | Circuit Switched Bearer |

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Here the SME is routing its intra-company voice traffic on its intranet, effectively 'for free'. In this segment the PBX is not impacted much by the Gateway: it treats it as another bearer channel with an assigned prefix (or perhaps does least cost routing).

The driver here is cheap/free calls. Equipement costs are small and pay back quickly.

SME Phase 4b: Data (+Voice)

Here the VoIP is inside the enterprise. The PBX has evolved into a CTI server for services, and a Gateway for the bearer channel. The digital modem still provides the data 'bearer channel'.

The driver here is vastly reduced capital costs, and extra services opportunities. However, there is a paradigm shift for end users.

SOHO Comms Server

HEWLETT PACKARD

Web • Remote dial-in

ISP

Comms Server

PSTN • ISDN

Phone

Internet Phone

Fax
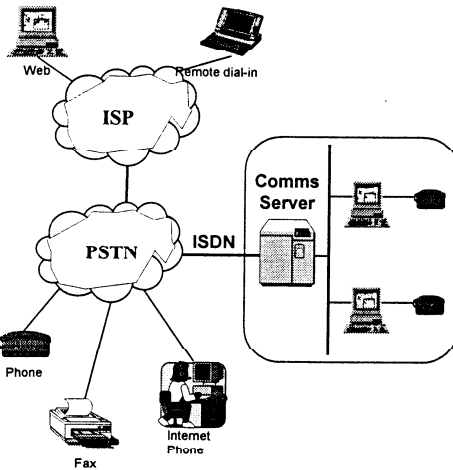
•Autoconfiguration
•Digital (ISDN) modem
•Hub/Switch
•Firewall
•Web client/server/authoring
•Email client

•DHCP/DNS
•Single Directory
•Remote tunnelling
•Administration tools
•Access Control
•UPS

•UMB (V/E Mail)
•Lan Telephony Gateway
•IVR/IWR
•Net Conferencing
•Auto-attendant
•ACD (follow me)

•Voice access to Web
•Voice access to Mail
•Fax server
•Fax-back
•TAPI

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This shows a re-aggregation of the PBX functions into a 'new PBX' or a Comms Server. In this guise (i.e. SOHO single box solution) this box provides a host of data services and a host of voice services. It also brings these two together - providing the sort of integrated media services talked about in the first slide.

Some products are already emerging in this space (e.g. Whistle InterJet).
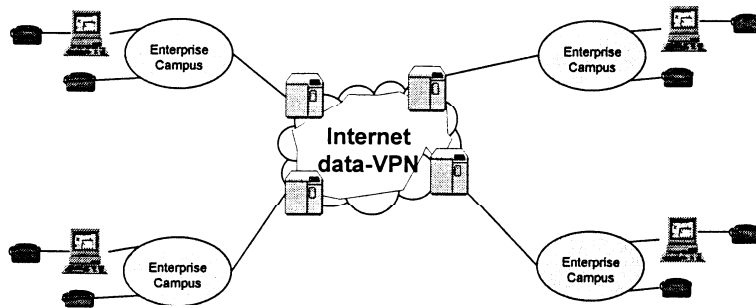
Enterprise Architecture
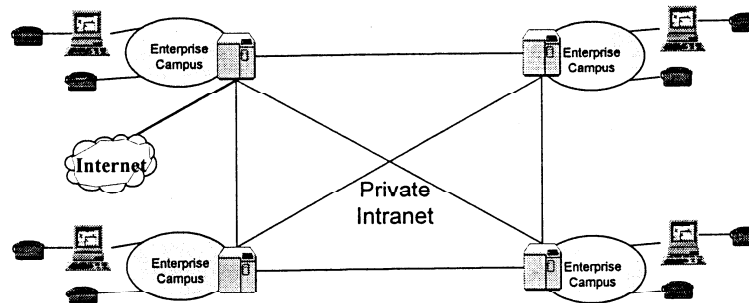
Comms Servers will be owned and run privately in a Private Intranet environment

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•With multiple sites it looks like this.

•The Comss Servers need to interact with each other over the IP network to provide end to end services.
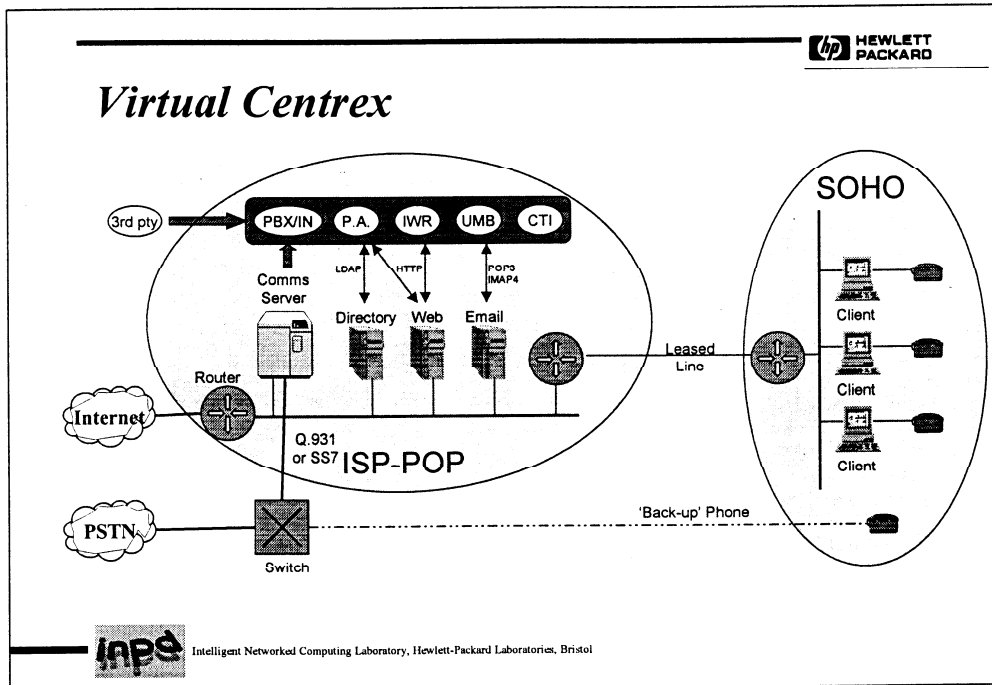
Enterprise Architecture: VPN

Comms Servers can be Outsourced in a Internet based VPN environment

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•If the enterprise network is outsourced via an Internet-based VPN (such as are emerging now), then the Comms Servers can be outsourced as well.
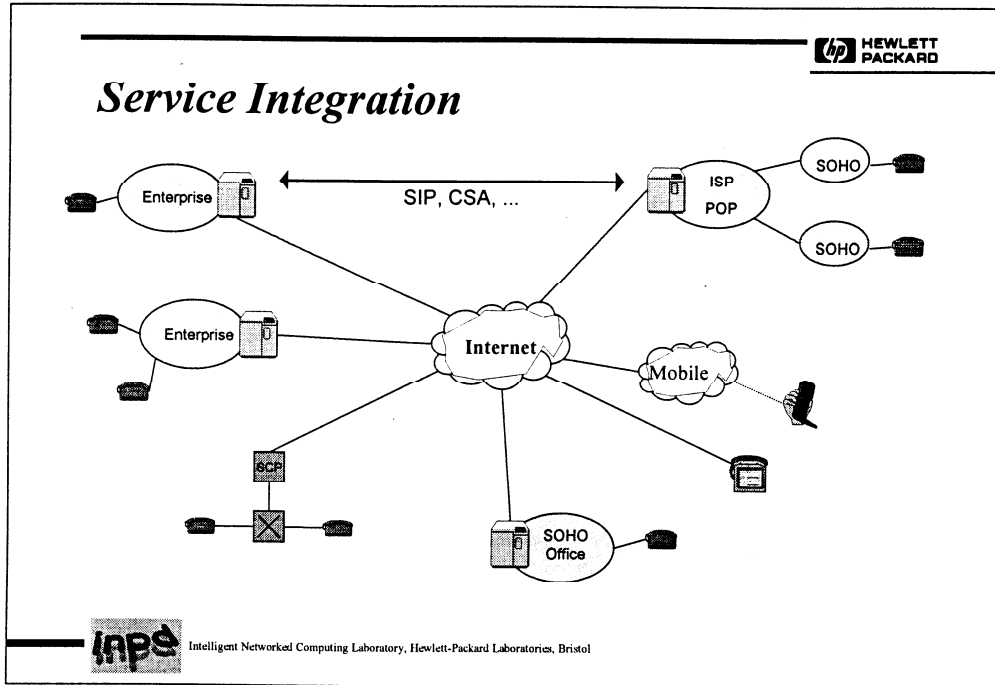
Virtual Centrex

Here an outsourced Comms Server provides Virtual Centrex services.

The SOHO has only a simple Digital Model or Leased Line termination equipment to manage - the ISP POP hosts the rest.

Telephone calls are delivered to the ISP and gatewayed onto the IP link to the SOHO (this is a well managed IP network, and thus the quality is good). Cetrex services provided by the Comms Server.

Centrex services are much more attractive in a packet switched network, since you no longer need one line per phone (IP network can access state and signal to all terminals).

Comms Server can record incomming calls if there is no answer or PC is off, and deliver them into the email server for later collection via UMB.

Service Integration

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What of the service integration side?

In a global network Comms Servers communicate with each other using emerging protocols (SIP/SAP/SDP, CSA SLEE etc).

There is much less difference between service execution elements now that there is in POTS world (e.g. PBX, Phone, IN etc).

Both smart appliances, mobile terminasl, and legacy SCP's can take part in the action too.

Summary

❑ User pull for better services

❑ Media and Service Convergence allow providers to meet this need

❑ VoIP is a major driver for both these areas - but work here can be applied to todays POTS networks in many cases

❑ VoIP gateways bring the voice media to the computer, and allow for deep integration of voice into the data world

❑ VoIP service protocols bring a lightweight Internet style to signalling, allowing services to execute across a number of platforms

❑ The PBX must become a player in this new Open, Interoperating, IP-based environment