

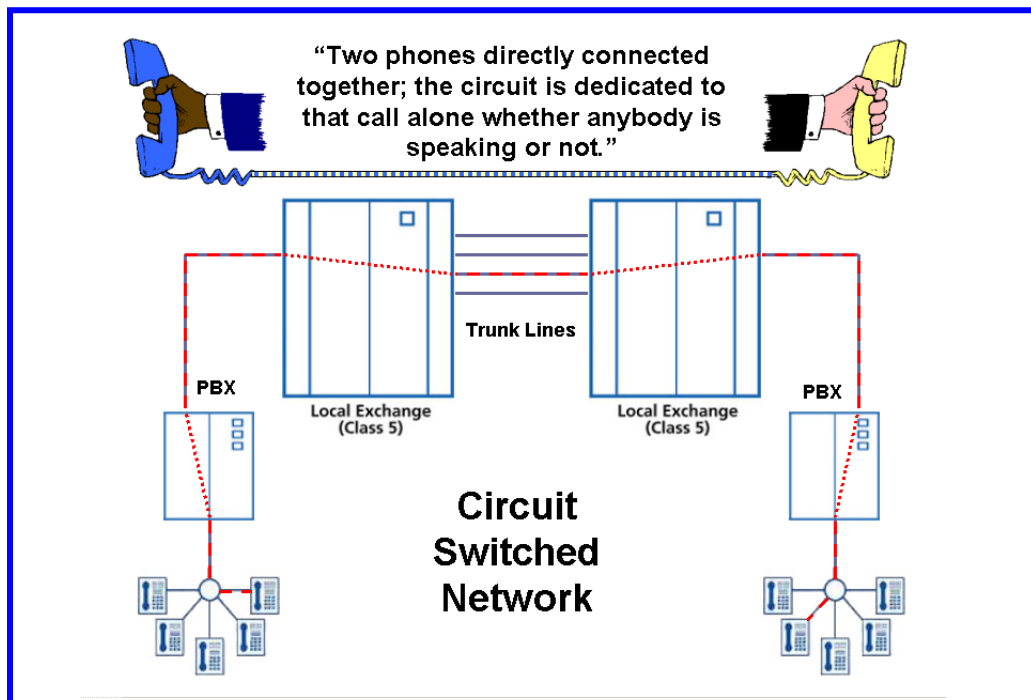
Migrating from Circuit to Packet: The Business Case for IP Telephony

Or “What’s In it for Me?”

Even amidst the turmoil the telecommunications industry finds itself in, industry pundits are still expounding the benefits of Packet Telephony. Forecasts may be down, but it appears that longer term, there has merely been a phase shift in the adoption rate. The trend, begun over the last few years, to migrate away from the circuit switched environment towards the more open world of IP Telephony continues. Why are the carrier and enterprise community alike adopting this technology and what benefits does it bring. The bottom line, as always, is WIIFM: What’s In It For ME!

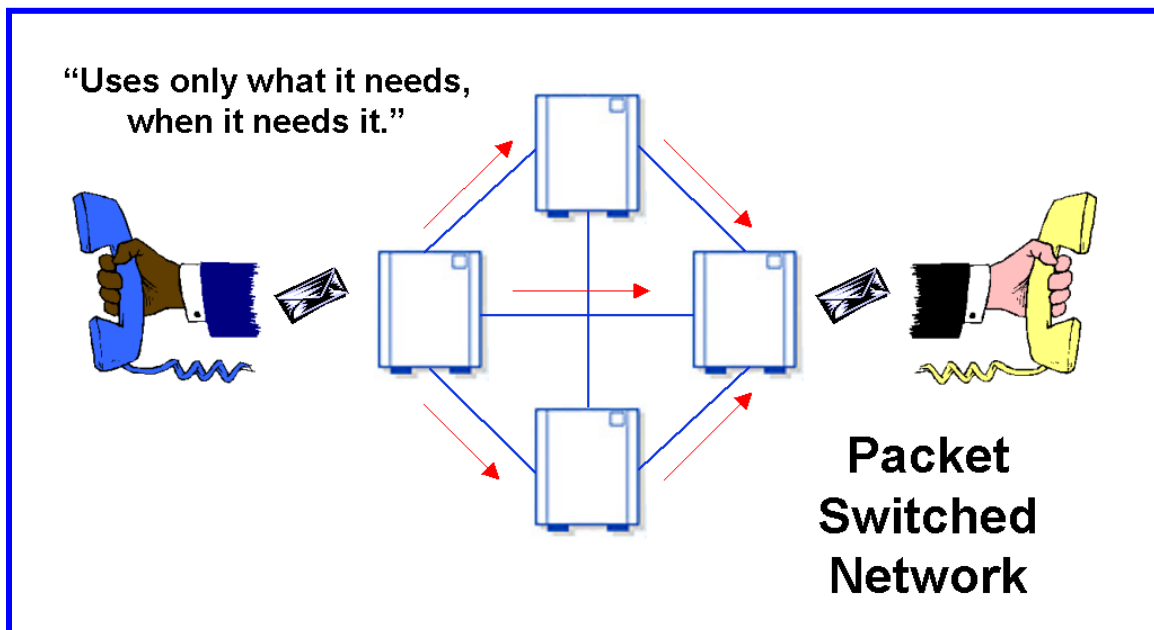
Circuit switching was the technology implemented for telecommunications networks many years ago. Voice telephony was (and predominantly still is) essentially based on creating a physical path (or circuit) between two handsets by closing a series of relays or switches. Today’s high-speed digital switches are based on the same circuit principals as the original switchboards with their manual operators who used patch cords to interconnect two parties. They do however manage many orders of magnitude more calls and with switch times measured in milliseconds. There may be no operator to relay the gossip anymore but the sole purpose of existence remains the same, switching voice circuits,

Although data communications have been around for 40+ years it was the advent of the Internet that created the most dramatic changes in our telecommunications infrastructure. The limitations and issues related to transmitting data using circuit switched equipment lead to the rapid adoption and deployment of packet based networking infrastructure across the carrier and enterprise worlds.



“Why the different networks?” I hear you ask; a good question. A circuit switched network, as we mentioned earlier, creates what is essentially a physical link between the two endpoints. It’s really like having the two phones directly connected together; the circuit is dedicated to that call alone whether anybody is speaking or not.

In contrast, a packet-based network does not tie up dedicated bandwidth for one call alone, it uses only what it needs, when it needs it. Multiple calls are transmitted over a single ATM or IP network, sharing and optimizing resources. In most conversations people are only speaking 50% of the time. With a dedicated circuit this 50% of “nothing” is sent along with the actual voice. In a VoIP environment, Voice Activity Detection (VAD) takes place prior to compression and packetization so wasted packets of silence are not transmitted. The packets, once inside the network, can take different routes to their destination. This allows for redundancy or traffic buildup issues to be solved through flexible routing.



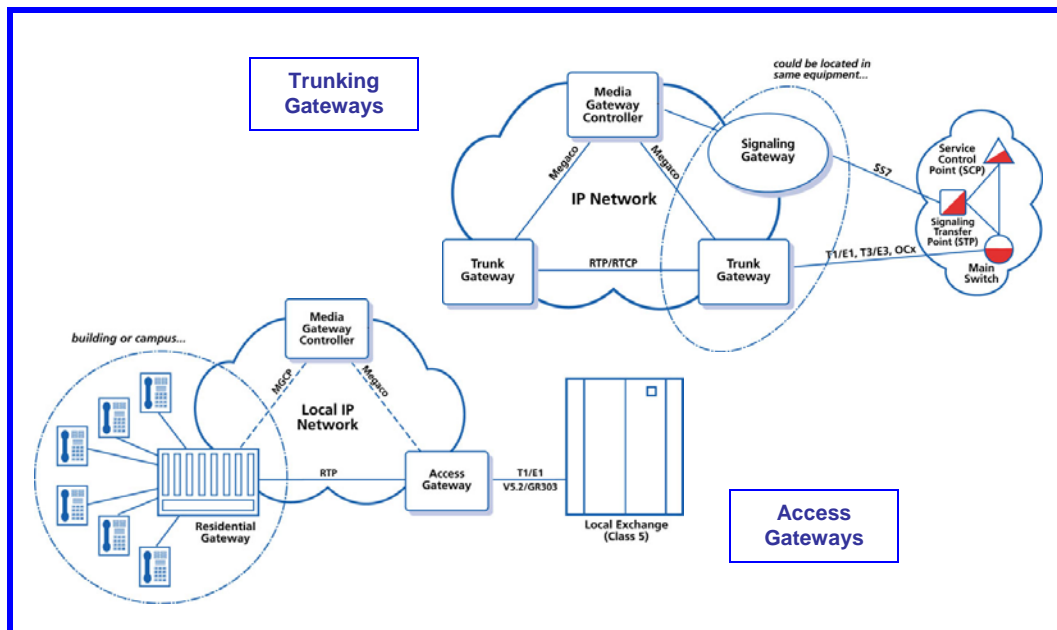
The equipment that makes up Packet Voice infrastructure separates the control and bearer traffic into different elements. The voice traffic itself is converted from circuit to packet using a Media Gateway while the Media Gateway Controller (often called the SoftSwitch) is the control element that manages the traffic flow. A number of different gateway classifications have been defined. Three primary elements are enterprise, access and trunking gateways.

Enterprise gateways are typically for installation within an organizations private infrastructure. They would interconnect a corporate intranet and the PBXs at both the HQ and branch offices, IP phones could also be directly connected to such devices. This would allow for voice traffic for frequent intra company

conversations to be carried over existing, owned, data infrastructure rather than that of the local or international carriers the company uses for regular telephone connections.

Access gateways are installed at the “edge” of the network and provide traditional analog or primary rate (PRI) line interfaces to a Voice over Packet (VoP) network. The inverse function is also applicable in VoB (voice over broadband) applications where the phone call is digitally encoded before entering the access network and needs routing via conventional telephony once inside the network.

Trunking gateways interface between the telephone network and a VoP network at the core. Such gateways are responsible for bulk conversion and typically manage a large number of digital virtual circuits.



The diagram, illustrates all the elements working in conjunction with the MGW to control the Packet Voice network. Along with the Media Gateway Controller or Softswitch one can see there is also a Signaling Gateway element. The packet telephony architecture uses a very different methodology for signaling and to allow for interworking with the existing world gateways are installed that connect directly to the established SS7 network.

Overall the next generation packet based systems are very efficient and the separation of the control and bearer planes allows for much flexibility. The network becomes highly extensible with individual elements designed specifically to fit snugly, matching the application requirements needed at distinct points in the infrastructure.

So we now know about the differences between circuit and packet telephony, but what are the realizable benefits of implementing packet-based architectures, WIIFM?

Depending on whether one is a service provider or enterprise the details are distinctly different but the perspectives are very similar. Collectively the benefits fall into two primary categories:

- Reductions in operational costs
- New and improved services

A recent report from Dittberner Associates, Inc. clearly substantiates this. Dittberner surveyed a number of ILECs & CLECs across the US. and Europe with a view to understanding their plans and directions for implementation of Next Generation Networks. When asked to rank what's driving them towards adoption of the new technologies the top answers were:

1. Operational Costs
2. Available Services from NGN Equipment
3. Scalability
4. Ability to Offer Bundled Services

Lets first examine how utilizing packet-based telephony impacts costs.

For any SME (Small to Medium-sized Enterprise), especially those with many widespread satellite offices, the reduction or elimination of inter office phone charges is one of the primary attractions. By utilizing spare bandwidth from data connections to carry remote office voice traffic a significant reduction in long distance and/or international charges can be achieved. Even calls outside the company can benefit from the packet-based gateways as calls can be routed first to the closest point to the destination before making their way into the PSTN. For example with offices in LA & New York one could initiate a call in LA destined for a customer in the Big Apple and it would be routed to the NY gateway and then a local call (for free) would be made from there. This facility would also work for international calls where savings could be much greater.

Service providers and enterprises alike can reap significant savings due to the reduction in support and ownership costs. This is possible, as only one data network is required to manage voice and data combined. Reducing equipment count not only saves on capital costs but ongoing utility charges fall as less power is consumed by the equipment itself plus items such as air-conditioning etc.

By far one of the biggest potential savings is in manpower support costs. VoIP gateways are essentially network routers and as such would be supported by regular IT or networking staff and specialized PBX or voice switching staff wont be required. Many enterprises use outside services to manage their PBX infrastructure, multiplied by numerous branch offices this soon adds up. Service organizations often charge for adding or moving extensions, provisioning a new IP phone is similar to adding a computer on the network, a few point and clicks and its done.

The aggregation of all traffic into a single network has the effect of significantly increasing overall efficiencies. Using packet based, IP or ATM streams to replace those fixed 64K circuits (especially in provider trunk circuits) can create bandwidth savings in the region of 20-30%, possibly more if using high levels of compression. The choice is then whether to realize cost savings by reducing bandwidth or fill that increased capacity with paying subscribers. Either way it generates cash to the bottom line!

The ability to introduce new capabilities to the enterprise or new subscriber services if ones a carrier is the second most commonly discussed benefit of packet voice technologies.

Bringing together disparate messaging technologies into a single system, all accessible through one's desktop is one such application, not surprisingly it's known as unified messaging. With IP telephony infrastructure if one is not there to answer the phone a message is taken as normal but now it's stored on a networked computer. When you return to your desk your voicemails are there in your "inbox" along with your emails. You can listen to them on your computer and call them back with the click of a mouse.

There is tremendous potential for sales and support centers. The opportunity for new ACD (Automatic Call Distribution) system functionality is greatly enhanced, especially in the area of voice enabled web sites that now become possible. When a customer visits such a website and needs help they can click a button and get through to an operator who is able to talk to them directly.

The ease of configuration makes mobility easy to achieve. With ones phone# now tied to an Ethernet address, wherever you are, so is your phone. Even concepts such as "Hot-Desking" become easier. Most companies have that block of visitors' cubes for use by out-of-towners. Now a visiting sales rep can simply "log-in" to the phone and the system knows who it is, routing all calls to that phone rather than the "home" desk that may be thousands of miles away.

I think we can see that in answering the WIIFM question "What's In It For Me" we have established the benefits are numerous. For many companies these potential cost savings and new capabilities will be easily realizable and aid their campaigns for increased competitiveness. Legacy issues do exist and the death

knell for PBXs and the vast arrays of circuit switches installed in networks across the world will not be heard for some time yet. One distinct advantage of the new packet technologies is the ability to install slow, then upgrade and extend over time. Coexistence is easily made possible while migration plans are created and implemented. Ultimately the efficiency and cost management trends continue downward and with carriers searching for that next killer service application the answers lay within the packet world. Whether searching for a solution or just beginning to explore the world of Packet Telephony, *functionality, cost efficiencies and competitive edge*, answer your question, **What's In It for ME?**