PRI vs SIP Trunking for Your Business

Does SIP or ISDN PRI trunking make the most sense for your business phone needs?

Enterprise telephony long ago advanced beyond analog business lines in favor of PBX telephone systems and ISDN PRI trunking. Now there's another option that may offer cost and performance advantages for companies that want to improve their voice services. It's called SIP Trunking. This paper will compare and contrast SIP Trunks with ISDN PRI circuits.

It's All Digital

You should know that we are still talking exclusively about digital telephony. There is no analog transport in either a SIP Trunk or PRI. What differentiates the two is that ISDN PRI is based on a switched circuit model and SIP Trunking is based on packet switching.

Both Trunking Systems Work

From a functionality standpoint when set up properly either option will work very well. Both ISDN PRI and SIP protocols are supported by virtually every IP PBX sold today. The idea behind digital trunking is to carry a half-dozen or more outside phone lines on a single digital line. Usually that's one or more T1 lines, although DS3, OC3 fiber or Ethernet can also be used.

How Many Lines In An ISDN PRI?

ISDN PRI uses a T1 line configured into 23 separate voice channels plus one data and control channel. Most PBX systems and the newer IP PBX phone systems make it easy to connect to ISDN PRI. They either offer one or more PRI ports built-in or accommodate a plug-in adaptor card.

Expanding ISDN PRI

If you need more than 23 lines, you simply add more ISDN PRI lines incrementally. Each additional line can bring in up to 23 more business phone lines. You'll have to check what's available for your phone system, but it is not uncommon to have 2 to 4 PRI lines plugged into a PBX system.

The Telco Legacy

The technology used for ISDN PRI is defined by the Integrated Systems Digital Network specification. PRI is the Primary Rate Interface. There is also a lower performance BRI or Basic Rate Interface that isn't seen much anymore. This is a legacy telephone technology designed to support the idea of separate digitized telephone lines, one per channel. There's no chance of interference between calls because the channels are strictly defined and timed using Time Division Multiplexing.

SIP On The Network

SIP Trunking is more of a network than a telephone based technology. It is a packet switched network line, much like you would use to connect two business locations. What SIP Trunking can do is directly support a converged voice and data network. You can run SIP Trunks between business locations to expand your voice and data network geographically.

Why SIP?

The SIP in SIP Trunking stands for Session Initiation Protocol. That's the switching technology used in VoIP telephone systems. In SIP trunking the control signals for the phone system are transported in packets that travel down the same network pipe as the voice packets. SIP can offer additional flexibility that ISDN signaling will not allow for and can offer some pretty compelling failover scenarios, but be cautions when choosing providers as service levels can vary greatly from one provider to the next.

ISDN PRI for External Calling

In today's data heavy climate there are real, tangible benefits to having separate telephone and data lines leave the premises. This reduces risk and enables the use of lower cost higher bandwidth (non SLA) data circuits to be used while maintaining a high service level on the voice communications circuit. You still are free to converge your in-house network and let an IP PBX system on the network handle call routing, including outside calls on the ISDN PRI trunk line.

But why would you connect a T1 PRI to a VoIP phone system rather than keep it 100% VoIP? The simple explanation is that the rest of the world isn't serviced by VoIP or at least the same VoIP provider. The only thing universal is the PSTN, where you can dial any number and get connected to any telephone in the world. Your enterprise VoIP phone system can save you a bundle on internal calls that stay on your own network. You can also buy a SIP Trunk that connects you to a telephone service provider completely in IP or Internet Protocol. But, guess what happens at that service provider when you want to call an outside number? That's right. You'll be switched through to the ISDN PRI lines that connect them to the public phone network.

SIP Trunking for External Calling

You can certainly use SIP Trunks to connect your PBX system to a telephone service provider rather than using an ISDN PRI. Depending on which CODEC, bandwidth, or coding scheme you use, you may be able to handle more than 23 lines on a SIP Trunk. If you are using an Ethernet connection to your provider, you may be able to support dozens of phone lines depending on the bandwidth available.

Quality of Service

The PSTN reserves bandwidth on all the circuits used to maintain a voice connection. VoIP doesn't support voice this way. Instead, VoIP packetizes voice traffic so that it can be handled like traffic from any other IP-based application. However, voice traffic can't tolerate loss, excessive delay, and widely varying delay, or jitter. IP networks may exhibit all these characteristics, especially over WANs. VoIP calls placed over best-effort IP delivery can sound a lot like phone calls in areas with poor cellular coverage.

Rate control and correction for loss and jitter may not always enable VoIP to achieve the voice quality we are accustomed to receiving over the phone network. Since the Internet at large offers a best effort delivery service, Quality of Service cannot be guaranteed regardless of the border equipment deployed. The only way to truly ensure QoS for SIP traffic is to deploy a dedicated private data circuit. It is always best to have the SIP service provider supply the circuit end to end to avoid a broken chain of liability.

Security

ISDN PRI travels end to end over private network and that makes a pretty compelling argument for its security. SIP traffic, when carried over a private network until it reaches the PSTN is also very secure, but SIP over best effort internet connection is inherently less secure.

Conclusion

Deploying a successful trunking solution for your business can seem difficult and sales engineers at less than reputable firms may promise the world, but there are no shortcuts in life, and the ISDN PRI has been the gold standard for over 20 years for a reason. That is not to say that SIP over a private data circuit cannot be an excellent choice as well, but if your business has little room for call quality issues, avoid SIP trunking over best effort networks or the internet at all costs.