



The Complete VoIP Telecom Service Provider

***Myth: SIP Trunks are Hard to
Configure***

- **What are we trying to avoid?**
- **Internet Access Choices**
- **InGate (SIParator vs Firewall)**
- **Customer Network**
- **PBX Setup**
- **Conclusion**
- **Q&A**



- High Latency
- Packet-loss
- Network Instability
- NAT Traversal Issues
- Blocked Ports
- Opening the Customer's Network to Hackers

What is Congestion?

FIGURE 1 - Congestion

Congestion invariably occurs at the "edges" of the network. These are the points in an overall VoIP traffic flow where high-bandwidth environments tend to converge on low-bandwidth environments. Typically the local loop connecting the customer's network to the service provider edge is where most bottlenecks occur.

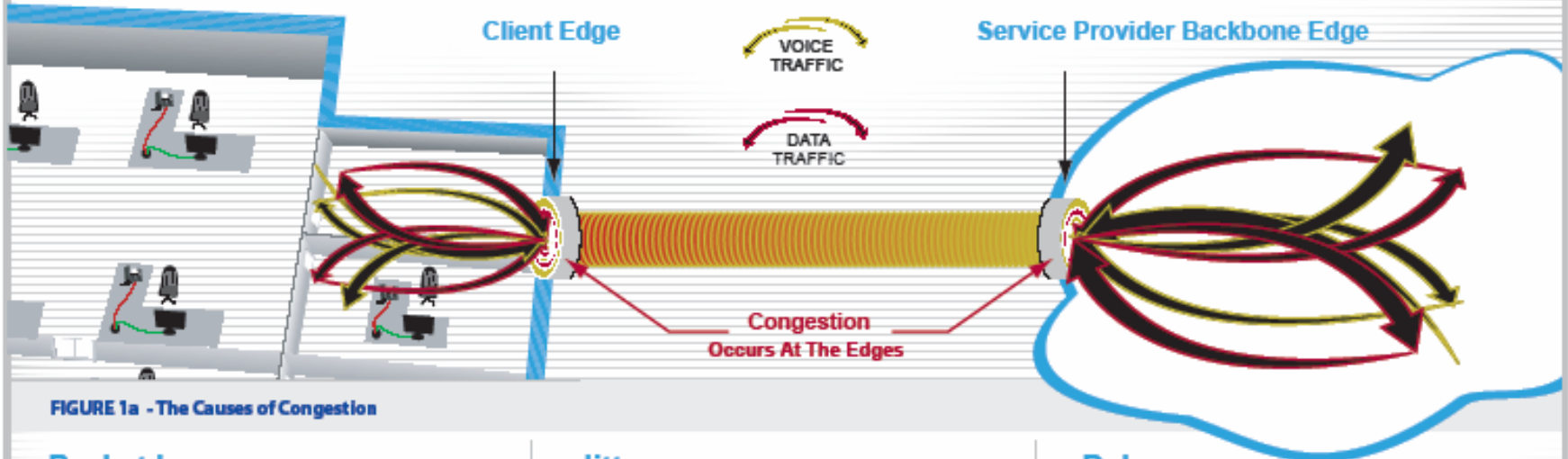


FIGURE 1a - The Causes of Congestion

Packet Loss

The routers may fail to deliver (drop) some packets if they arrive when their buffers are already full. Some, none, or all of the packets might be dropped depending on the state of the network as it is impossible to determine what will happen in advance. The receiving application must ask for this information to be retransmitted, possibly causing severe delays in the overall transmission.



Jitter

Packets from the call source will reach the destination with different delays. This variation in delay is known as jitter and can seriously affect the quality of streaming audio and/or video.



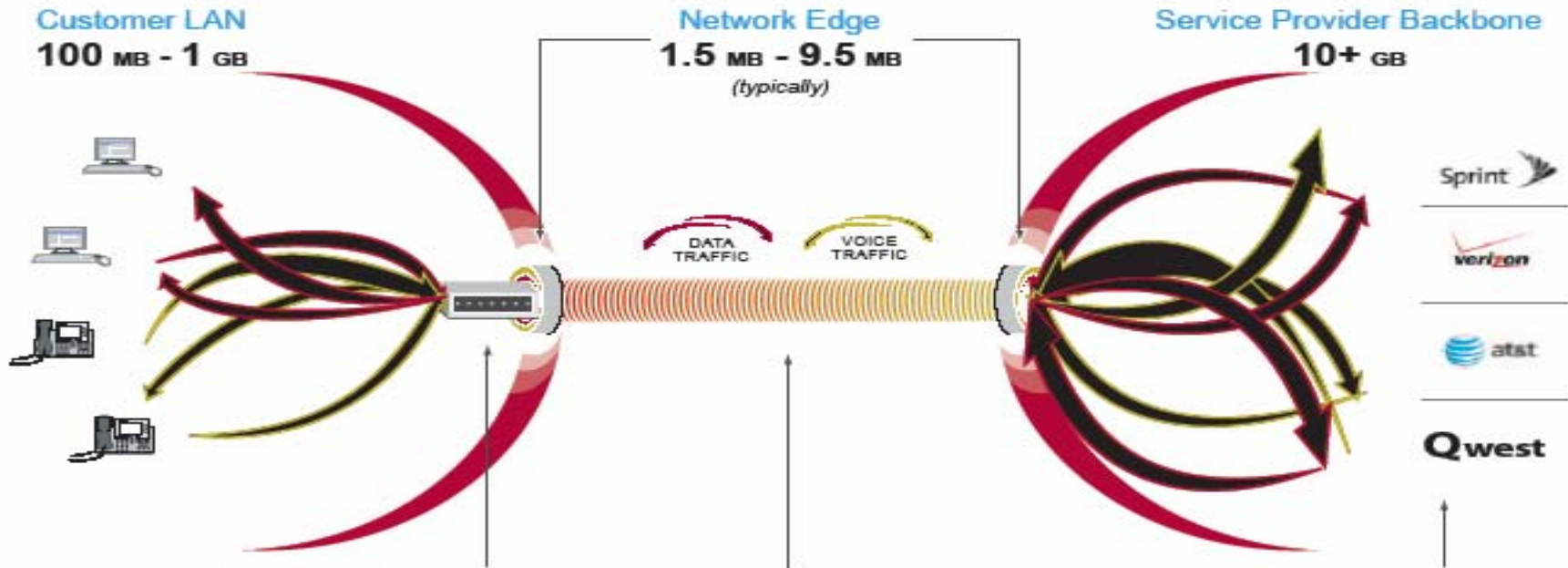
Delay

It might take a long time for a packet to reach its destination because it may get held up in long queues, or take a less direct route to avoid congestion. Though excessive delay can degrade voice quality, delay tends not to effect VoIP traffic which is very insensitive to increases in packet delay.



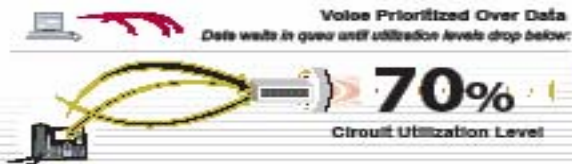
Where is the Congestion?

FIGURE 2 - Explaining QoS



The Brains Of Your Operation - QoS Router

Bandwidth.com can provide a customer with a fully managed QoS router that is placed on the customer premise. This QoS router has a robust set of QoS mechanisms it can employ to identify voice traffic (inbound or outbound) and ensure that the required amount of bandwidth is made available. During times of potential congestion (i.e. when utilization levels over a circuit approach 70%) the QoS mechanisms are initiated.



The Size Of The Pipe Matters

A highly reliable and simple to implement approach is to provision an amount of bandwidth (local loop and port) sufficient enough to preclude any potential congestion.



Go With The Pros For The Best QoS

Tier 1 providers such as Sprint, Broadwing, Qwest, AT&T, or Verizon, etc. have made significant investments in their backbone architecture that eliminate the risk of congestion over their networks. Bandwidth.com highly recommends providing voice and data service over a Tier 1 network or other service provider certified by bandwidth.com.



G.711

- Un-Compressed Voice
- Best Quality
- Budget 85K per Concurrent Call
- Ideal when the amount of bandwidth is not an issue.

G.729a

- 8 to 1 Compression
- Lower Quality
- Budget 30k per Concurrent Call
- Ideal when waiting for new bandwidth to be provisioned or when the bandwidth on site is very good.

Estimate Bandwidth

Current Data Peak Utilization (Kb) +

(Concurrent Calls X Codec Budget Kb)

The Good

- Covad Voice Optimized Access
 - ADSL
 - SDSL
 - T-1
- Sprint or Qwest Priority Queued T-1s
- Tier 1 Internet T-1 and above

The Bad

- Plain xDSL
- Cable Internet
- Tier 2 or 3 Internet Access
- Pre-Wimax Wireless
- Satellite
- Shared Internet Circuits

NAT Traversal Issue

Standard NAT does not work with SIP. SIP message contains IP address of the PBX and traditional NAT does not translate.

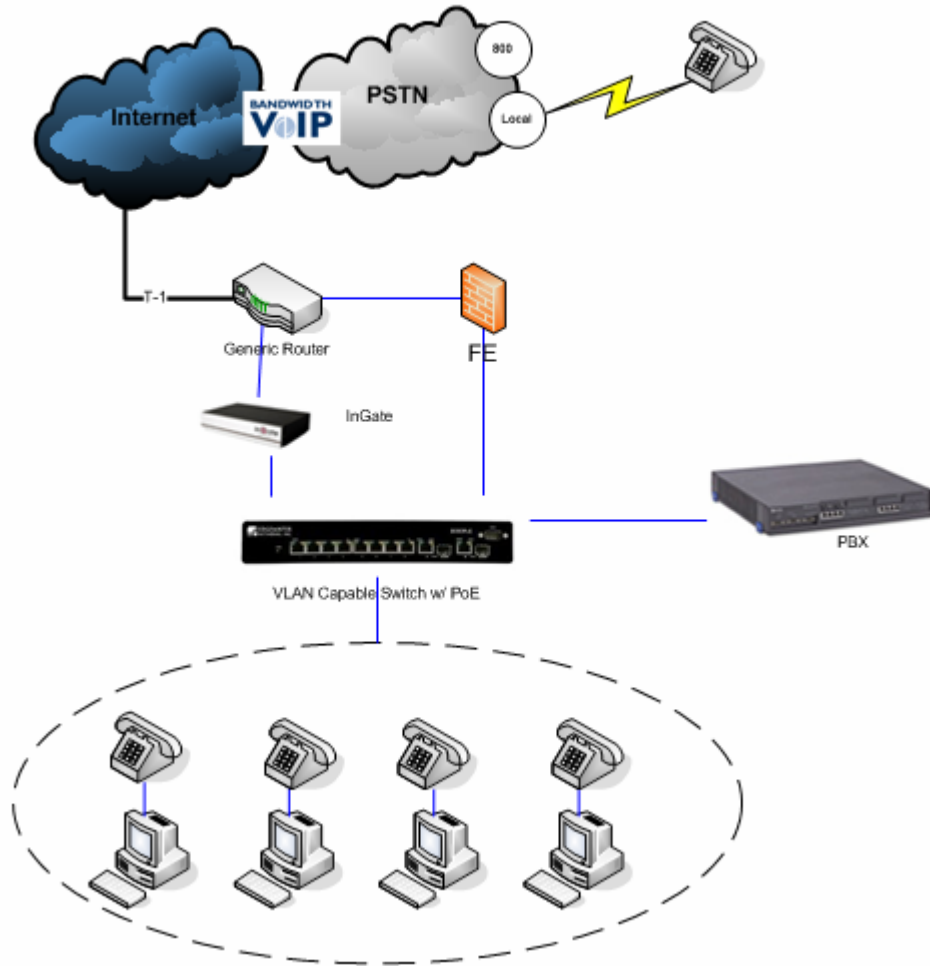
To support SIP with NAT the router or the Firewall that is performing NAT must possess Application Layer Gateway (ALG) functionality.

SIP Aware Firewall

With standard firewall 10s of thousands of ports would need to be permanently opened in corporate firewalls

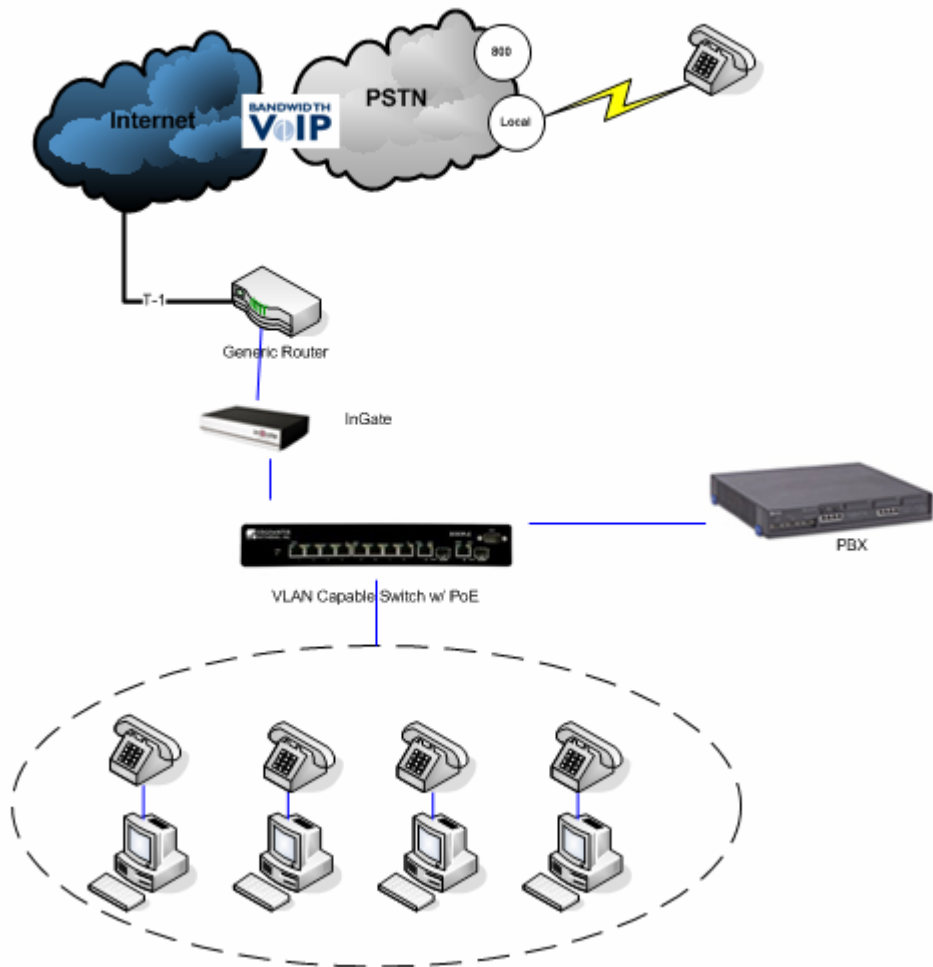
SIP Aware firewall opens ports for specific calls and then closes them when calls complete

SIP Trunking w/ an InGate SIParator



- Used when the customer requires their own firewall.
- Automated setup wizard
- Remote registration and NAT capabilities
- NAT Traversal & SIP Compatibility options

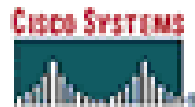
SIP Trunking w/ an InGate Firewall



- Used as the customer's firewall.
- Automated setup wizard
- Remote registration and NAT capabilities
- NAT Traversal & SIP Compatibility options
- Traffic shaping

- 100MB Network (Standard)
- Good Certified CAT5 wiring
- Managed switches with VLANS
- LAN QoS
- NO HUBS!!!

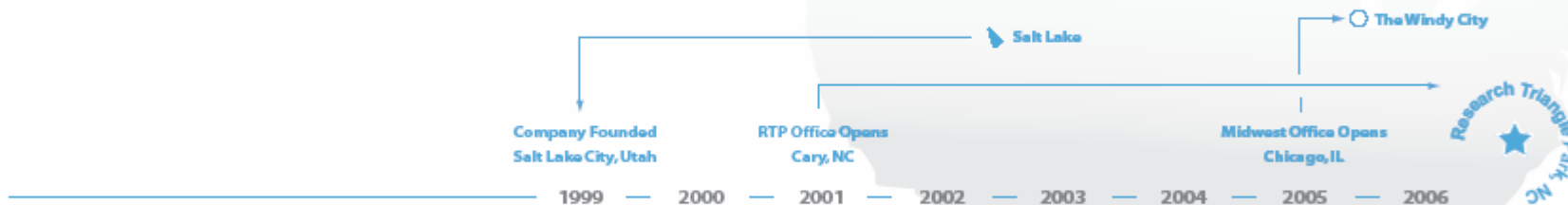
- Use good buying practices when choosing a PBX
 - References
 - Capabilities
 - Capabilities
 - Support
- Use a SIP Trunking carrier recommended and with support ties to your PBX manufacturer
- Application Notes (Config notes)
- Follow Manufacturer best practices for SIP trunks
- Make sure Integrator has setup the PBX with the carriers SIP trunks. They should have a demo lab.



- Network planning has a lot of the same goals and best practices of any competent network.
- With reduction of cost, the right network steps are easier to take.
- InGate SIParator or Firewall are easy to setup with wizard.
- Many competent Internet Access options
- PBX manufacturers have application notes
- If you practice setting it up on Integrator site, customer's site is cake

Bandwidth.com is a complete provider of telecommunications services to

Small and Medium Sized Businesses in all 50 States



Founded in 1999 in Research Triangle Park, North Carolina

- First broad-line data provider
- Offered businesses ability to compare 20 different carriers with online pricing
 - API connections with all Tier 1 providers
- Created 1st Installation tracking portal for small and medium business customers
- Launched VoIP in 2004

250%
Annualized Revenue Growth

Profitable

100+ Employees dedicated to voice and data sales and support

99.1%
Customer Retention



- #1 fastest growing privately held telecom company in the Country
- #1 fastest growing privately held company in North Carolina
- #16 fastest growing privately held company in the Country



Annual award given for a company's achievements in creating a positive work environment that attracts and retains employees through a combination of benefits, working conditions and company culture.

TRIANGLE BUSINESS JOURNAL

- Questions?