Wiretapping the Internet --- (or How Not to Introduce Security Holes into a Communications Infrastructure)

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"Tidewater Muse"

Communications Assistance for Law Enforcement Act (CALEA)

- U.S. law that digitally switched telephone networks must be built “wiretap-enabled.”
- Standards determined by the FBI.
- International effect.
- Law originally applied to telephone services, not “information services.”
- 2003-2006 expansion of law to “easy” case of VoIP.
- Now attempt to expand the law to all cases of real-time communications.

Circuit-Switched v. Packet-routed Networks

- Circuit-switched means a dedicated circuit that lasts the whole call.
- Packets of a packet-routed network can, theoretically, take different paths between the endpoints.
- Packet-routed is versatile; it routes “around” problems.

The Networks are the Same:

- Same type of transmission facilities (often sharing same cable).
- Use electric routing/switching devices
- Use transmission links and switching and routing equipment parsimoniously.
- Many facilities-based companies operate networks and must work together to deliver user's traffic.
- Both began with all-you-can-eat pricing model.
- Both use digital transmission and time-division multiplexing.

The Networks are Different:

- PSTN historically used expensive switches to provide quality. Internet and Arpanet used relatively inexpensive routers for “best-effort.” Internet now migrating to switch-based technology for QOS.
- Internet eschews intelligence in the network. PSTN uses network-based intelligence for dumb terminals, enabling legacy telephones.

What's Important about VoIP?

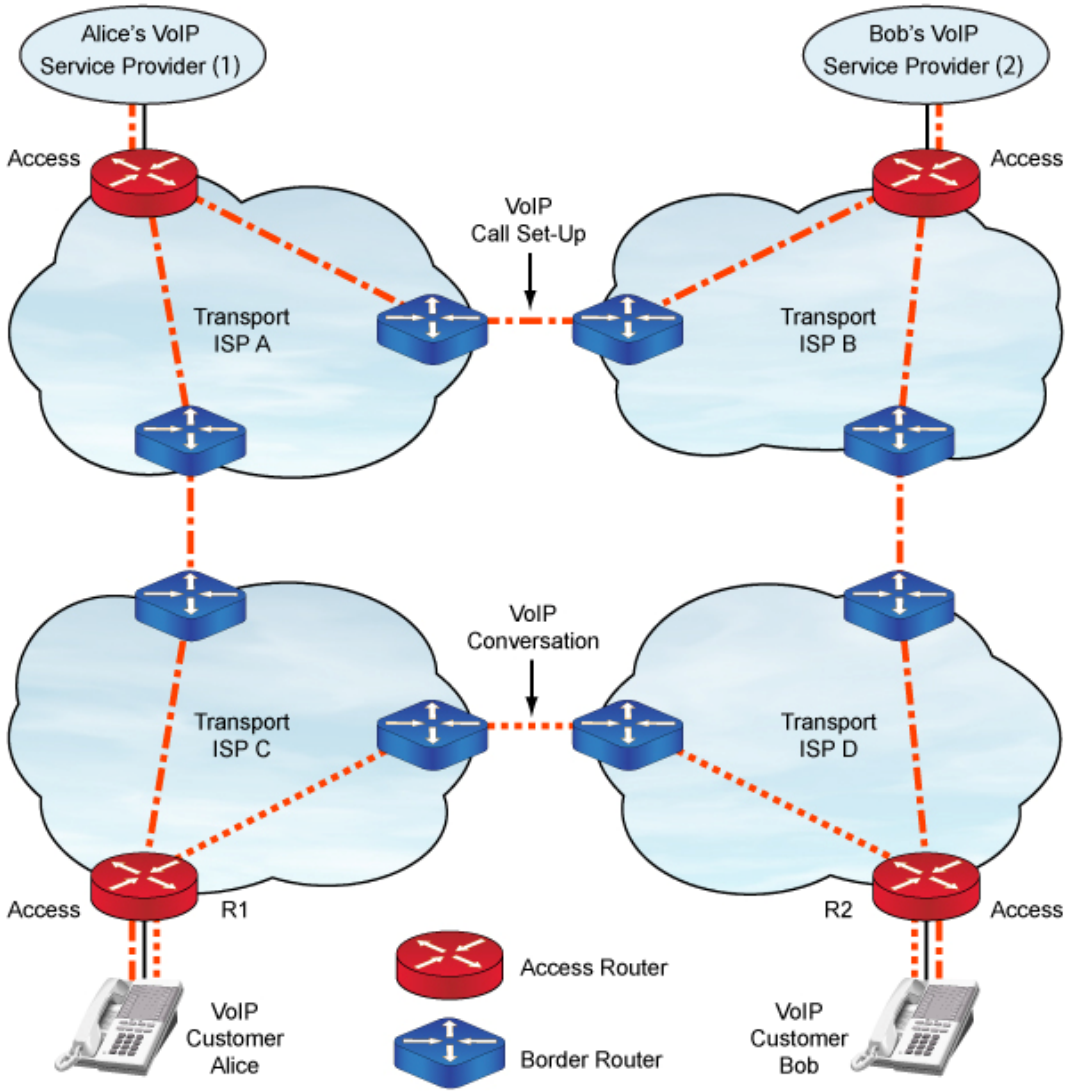
- Variety of VoIP models.
- Mobility.
- Ease of creating new identities on the Internet.

What's Complicated about Applying CALEA to VoIP?

- Variety of VoIP models.
- Mobility.
- Ease of creating new identities on the Internet (artifact of little or no authentication for most Internet applications).

Don't We Already Have Wiretaps with Mobility?

- Cell phones
- Roving wiretaps


Alice's VoIP
Service Provider (1)
Bob's VoIP
Service Provider (2)
Access
Access
VoIP
Call Set-Up
Transport
ISP A
Transport
ISP B
VoIP
Conversation
Transport
ISP C
Transport
ISP D
Access
R1
R2
Access
Access Router
Border Router
VoIP
Customer
Alice
VoIP
Customer
Bob

What's the Problem? I

- Physical security of the switching/routing equipment into which wiretaps are inserted --- can't be predicted in advance. There are 1300 VoIP providers in U.S. with fewer than 100 employees. The same model exists elsewhere in the world.
- Ease of creating new identities on the net.
- Secure transport of signals to law enforcement.

What's the Problem? II

- Increases risk that target discovers wiretap is in place.
- Difficulty of ensuring proper minimization because of mobility and agility issues.
- **Increased risk of introducing vulnerabilities into Internet (IETF RFC 2804).**
- Search engines + vulnerabilities = a dangerous combination.

Here's One Risk (there are others):

- At 10:23 PM PST, attackers found vulnerabilities in computers at the U.S. Army Information Systems Engineering Command at Fort Huachuca, Arizona.
- At 1:19 AM PST, they found the same hole in computers at the military's Defense Information Systems Agency in Arlington, Virginia.
- At 3:25 AM, they hit the Naval Ocean Systems Center, a defense department installation in San Diego, California.
- At 4:46 AM PST, they struck the United States Army Space and Strategic Defense installation in Huntsville, Alabama

Nathan Thornburgh, Time Magazine, August 25, 2006

What's the Real Problem?

- People call people, not IP addresses.
- If you're trying to do VoIP on a fixed line directly to large ISP: Easy. Anything else: HARD.
- The proposed expansion of CALEA is worse. It would cover: any real-time communications, any WiFi provider of more than 300', and would force a “point-of-presence” requirement for applications used in U.S.

Security Implications of Applying the Communications Assistance to Law Enforcement Act to Voice over IP

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Security Implications of Applying the Communications Assistance for Law Enforcement Act to VoIP

- http://www.itaa.org/news/docs/CALEAVOIPreport.pdf

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