

# Technical Aspects of the PSTN Transition

Canadian Radio-Television and  
Telecommunications Commission

May 30, 2012

Richard Shockey  
Shockey Consulting

Chairman, Board of Directors, SIP Forum

Reston, VA 20191

[richard@shockey.us](mailto:richard@shockey.us)

Voice +1 703 593 2683

Skype/LinkedIn/Facebook – rshockey101

# Who Am I?

- Private Telecommunications Consultant based in Washington, DC.
- Chairman of the Board of Directors of the SIP Forum (Session Initiation Protocol industry promotion board).
- Long time participant in the Internet Engineering Task Force (former ENUM co-chair).
- Member of the US Federal Communications Commission – Communications Security Reliability, and Interoperability Council.
- Geek.

# How Did We Get Here?

- The phone system is approaching technical obsolescence.
  - It cannot be upgraded.
  - It is a 35 year old infrastructure.
  - It is decaying.
  - It needs to be renewed.
- When I say “phone system” I mean:
  - public switched telephone network (PSTN) running on time division multiplexing (TDM) and signaling system 7 software protocols (SS7).
- The FCC and the CRTC seem to be coming to similar conclusions about the transition.

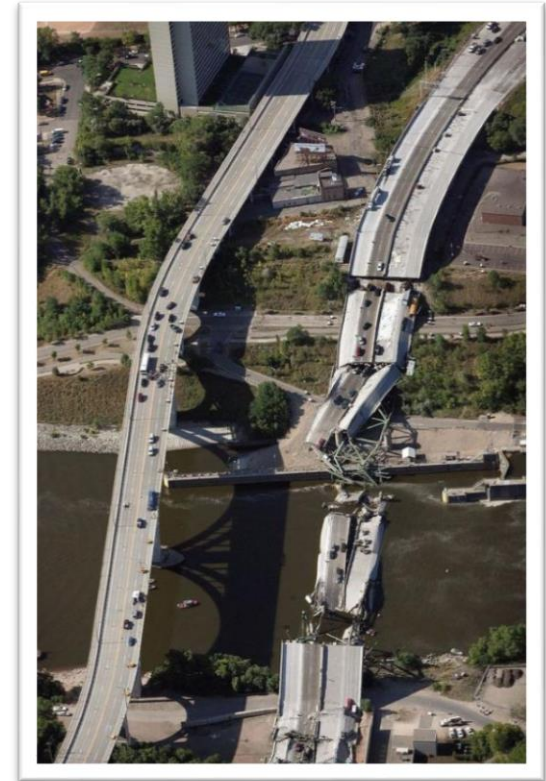


# Phantom Traffic

- The recent record (2011-12) at the FCC during the Intercarrier Compensation / Universal Service Reform docket exposed many of these end-of-life issues.
- One, for example, is “phantom traffic”.
- The FCC public record showed that the carriers were losing hundreds of millions of dollars in revenues for traffic they could not bill for.
- The existing equipment could not be upgraded.
- What does this missing revenue mean for everything else?

# The State Of The Phone System

- This begged the question where are we at with core phone system switches of the Class 5s?
  - Spare Parts in critical supply.
  - Yes eBay...
  - Skilled teleco personnel retiring.
- The Transition *MAY* be a Public Safety issue.



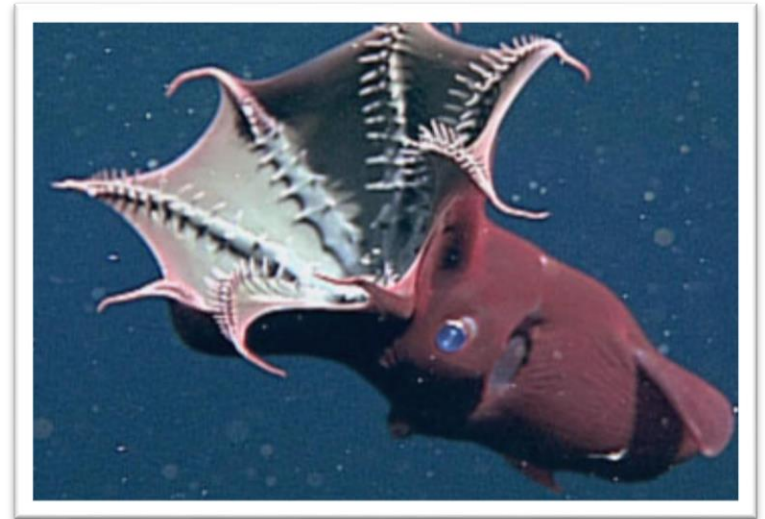
# The Social Contract Continues

- There is still a PSTN “social contract”, though the terms of that are yet to be defined.
- We assume
  - *Reliability*
  - *Affordability*
  - *Accessibility*
  - *Ubiquity*are still guiding principals
- But there is a lot of regulation that is also obsolete.



# Economics

- The existing technology is draining money out of all the carriers that could be better used to provide, say, broadband access.
  - Voice is simply one of many services.
  - Gateways between POTS and SIP/IP are very expensive.
- We really want something that is better.
  - Better Voice Quality.
  - High Definition Voice.
  - Point to Point video.
  - Rich text media.
  - End to End IP.
  - The chance for innovation.



# How to Get Bits From A to B

- The old software and network were designed for voice.
- The new network is designed for voice, video, and anything you can imagine, or have not yet imagined.
- All bits may be created equal, but some bits are more equal (valuable) than others.
- Issue: How to get high value bits to flow better, faster, cheaper and reliably.
- Solution: enter SIP.
  - Session Initiation Protocol
  - Developed by the IETF in a open consensus driven process among international engineering stakeholders.



# The State of SIP

- There is universal technical consensus that SIP will be the dominant model for the delivery of services using phone numbers.
- SIP is emerging as the dominant mode for the delivery of business voice communications.
- Cloud Telephony (IP Centrex) is SIP as well.
- SIP-based Voice is poised to dominate the North American market, especially in fourth generation (4G) mobile networks.
- Bell Mobility, Rogers, Telus, and Cogeco have begun to deploy the next generation of mobile communications [LTE], as have ATT, Verizon, *et al.*



# The Good News – Technology

- We have about 85% of the technical underpinnings in place for the transition from POTS.
- We have a lot of SIP in the field – it works well.
- Bad News: The last 15% is unknown.
  - We don't know what we don't know.



# I Hate Quoting Donald Rumsfeld

Former US Secretary of Defense

- “Now what is the message there? The message is that there are no "knowns." There are things we know that we know. There are known unknowns. That is to say there are things that we now know we don't know. But there are also unknown unknowns. *There are things we do not know we don't know.*”



# The 15% We Do Not Yet Know

- The transition to an all-IP system based on SIP requires more work.
- The purpose of this talk is to expose what we do not yet know, but needs to be done.

# Technical Issues of Concern

- Quality of Service.
  - The existing consumer/business satisfaction must be maintained.
- How do we independently measure both broadband performance and voice reliability in the new environment?
  - We do not know exactly what the new environment will be.
- How do we deal with network congestion in the new all-IP environment?

# Tensions Between Old and New

- We dealt with network congestion by not allowing it.
  - we kept control at the edges; nothing got in to the system the carriers did not want.
- In the new system, we do not yet have the control we once had.
- The old system is slowly failing; the new system is not yet perfected.



# Technical Issues of Concern

- IP Interconnection is not just about voice. The mobile Short Message Service (SMS) must be converted to all-IP as well.
  - You have to kill SS7 (the old signaling software) at the same time.
- We need agreements among carriers on how the new IP interfaces will work.
- Voice security and privacy must continue.
  - The user profile databases that telcos use must be upgraded.

# We Need To Work Out...

- The role of IPv6: New networks need new addresses.
- International Interconnection: We do not know how international calls will be integrated into the new system
- Emergency 9-1-1: The location of people in need, especially in large buildings, and conveying that information to public assistance, needs work.
- IP Interconnection agreements between carriers: Who is responsible for what?



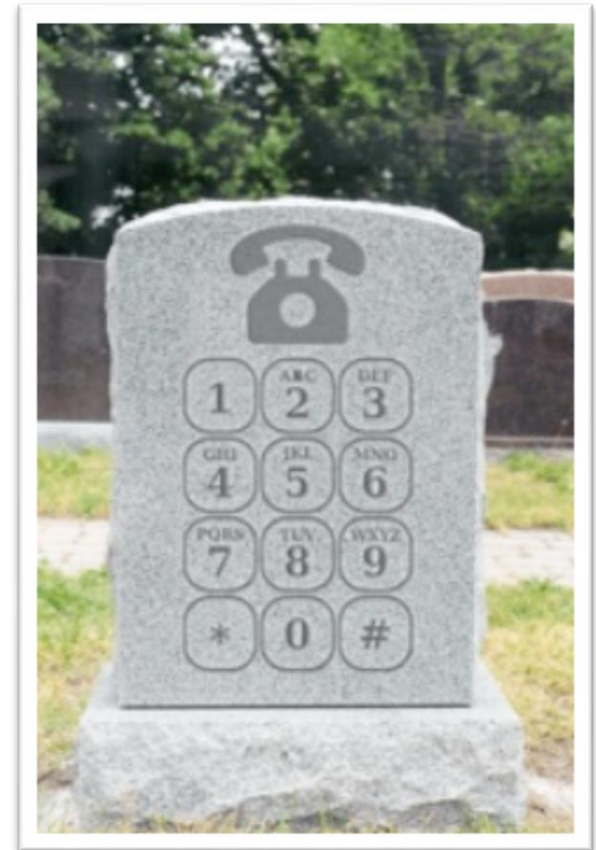
# Telephone Numbering

- Phone Numbers have been essential to the deployment of a ubiquitous and universal real time communications service.
- A lot of transition problems involve numbering.
- We are going to need a 3<sup>rd</sup> numbering database: Telephone number to Internet Protocol.
  - CRTC clearly understands this (CRTC Policy 2012-24).
- The Canadian carrier ENUM database is essential if the industry is to innovate.



# More Numbering Issues

- The bill and keep model and the restructuring of local interconnection regions (LIR) offers some new opportunities to rethink numbering policy.
  - One number for life?
  - No geographic connection?
  - Ubiquitous full ten-digit dialing (increases size of Canadian number plan by 20% automatically). The D digit.
- Should phone numbers be more like domain names?
  - Do you own them?
  - Are they tradable?
  - What about 800 numbers?



# Conclusions

1. The transition of the phone system to all IP may be more complicated than initially anticipated.
2. Discussions in the US have focused on a 7-8 year full conversion time frame.
3. The CRTC's Regulatory Policy 2012-24 is great, but we need to think seriously about the amount of work yet to do.
4. We need to think about a time frame and plan for getting things done.
5. The FCC in Report and Order 11-161 USF/ICC has come to virtually the same conclusions as the CRTC did in 2012-24, is there some way to:
  - Facilitate an exchange of views between the CRTC and FCC.
  - Involve the stakeholders.
  - In an open, transparent manner.



Questions?