Centralized SIP Trunking: Benefits and Lessons Learned

Event Code: TECH9

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Senior Solutions Engineer  
AVAYA
SIP Trunking - A Case Study on Foley & Lardner LLP

The Journey Begins......

Don Lowen
Sr. Manager of Engineering & Operations
Foley & Lardner LLP
Agenda

- Why take this leap? What are the benefits?
- The Contenders
- Design Overview
- Other Design Considerations....
- Planned Approach for Implementation
- Next Steps...
But First.....About Foley & Lardner LLP

- Almost 2400 customers (attorney/staff)
- 21 offices / 18 US-based offices in scope
- Centralized Call Manager 7.1(5) cluster
- Redundant PRIs & Gateways at each office location
- Three MPLS-based WANs / Full mesh topology
Why?

- “Right-Size” our channel capacity
- Significant cost savings estimate (about 50% Local/LD)
- Inbound BCP strategy
- Reduce reliance on Cisco AVVID
- Reduce equipment costs
- Simplify carrier contracts
The Contenders

- AT & T
- Verizon
- Century Link
- Time Warner Telecom
And The Winner Is.....

- AT & T IPFlex
- Largest LEC footprint
- DID Portability
- Cisco CallManager compatibility
- Customer References
Design Overview

- Centralized Deployment Model
- 600 Call Paths
- Datacenter Redundancy
- Local Office WAN Redundancy
- Add IPFlex To AVPN MPLS Network
- Cisco CUBE Session Border Controller
Design Overview
Design Considerations

- Call Paths derived from CallManager RTMT / Carrier Bills
- G.711 Codec (Planning 100K/call; G.729a @ 35K/call)
- CoS Review/Bandwidth Review With AT & T / Internal Team
- Contingency Plan Options
- Session Border Controller Management Approach
- Telephony-related applications (Fax)
Other Considerations

- On-Net vs. Off-Net
- Is a Local Call *Really* a Local Call?
- Long Distance; International Pricing
- Status of Current Carrier Contracts
- 9-1-1 / Extension Mobility
- Partnerships / Staff Training
Implementation Approach

- On-Premise Design / Cisco Partner
- Mid-sized Office Pilot(s)
- AT & T LEC Office
- Application Testing / Replacing Analog Gateways
- Aggressive Migration??
Next Steps

- Take Delivery of Upgraded MPLS Circuit in Secondary Datacenter (Router too)
- Finalize Test Plan
- Build CUBE
- Corresponding CallManager Configurations Changes?
- Knowledge Transfer From Cisco Partner
Previous MBF Teleco Design

Total 7 PRI’s
23 Channels Per PRI = 161 Channels

PRI Cost: $5,380/month
Usage: $6,100/month
MBF MPLS Network

- **MPLS #1**
  - Milwaukee (Backup Data Center)
  - 45 Mbs
  - Madison
  - 15 Mbs
  - Chicago
  - 45 Mbs
  - Manitowoc
  - 4.5 Mbs

- **MPLS #2**
  - 45-100 Mbs
  - 45 Mbs
  - Waukesha
  - 45 Mbs
  - 10 Mbs

- **Primary MPLS Carrier**
- **Secondary MPLS Carrier**
- **Primary Data Center**
SIP Considerations

- Cost Savings
- Trunk Capacity
- Quality Concerns - G.711 (87K), G.729 (31k)
- Redundancy - Disaster Recovery
- Fax & 911 Services
- Caller ID - Keep Multiple #’s
- Terminating Current Contracts
Process for SIP Move

- Session Border Control
- SIP Trunks In CCM
- Dial Peers & Translation Patterns
- QoS For Voice Traffic
- Assigned New DID’s To Pilot Group
- Port DID’s By Office To New Carrier
Current MBF Telco Design

Both Data Centers

BOSTON

PSTN

DALLAS

Dual MPLS Carriers

80 SIP Trunks To Both Data Center = 160 Trunks

SIP Costs: $1,600/month (70% Savings)
Usage: $3,850/month (35% Savings)
Issues with SIP Move

- Port Headaches - 6 Month Delay
- Inbound DTMF - Not Tested
- Carrier Didn’t Own All DID’s
Post SIP Move

- Happy With Quality (G.711)
- Scheduled Outages Not Call Impacting
- Streamlined Process for Office Expansion (D.C.)
THE PATHWAY TO SIP.....

Ken Cook… AVAYA
SIP Evolution Challenge

The business advantages to SIP are clear

- Operational efficiencies
- Collaborative communications
- Network consolidation

However…

How do you justify the investment?

- What will my SIP network OPEX savings be?
- Where’s my business case for evolution costs?
- How do I structure roadmap for maximum return?
How do you Realize the 30% savings from SIP?

**SIP Economic Assessment:**

- Understand your OPEX spend
- Build a Savings Estimator
- Develop the business case and payback period with phasing options.
EXAMPLES OF “FINDING THE MONEY”

- THE HIDDEN COST OF MAINTENANCE
- THE SUBTLETIES OF USAGE COST
SIP Economic Assessment

High-Level Approach

Phase #1
1. Current State
   Discovery & Analysis

Phase #2
2. Future State
   Strategy Workshop

Phase #3
3. Network Optimization
   & Business Case Development

Engagement Timeline

Week #1
Engagement Kickoff

Week #2

Week #3

Week #4

Week #5

Week #6

Review Service Provider to build current state network & OPEX spend

Workshop to align stakeholders on SIP strategies & benefits for future network state, plus identify business needs, company vision & critical success factors

Build Network Business Case for SIP evolution: consolidate workshop inputs, create a Business Case with network CAPEX payback from network OPEX savings, provide phasing options as needed

Discover OPEX in Current State, Focus Workshop on Finding Optimal Strategy for ROI
Example Deliverable: **IT Network Diagram**

You can easily find anything in your IT Infrastructure with complete Drill-Down Details.
SIP Economic Assessment
Phase 2: *Future State & Gap Assessment*

### Objectives
1. Select SIP strategies to optimize network communications costs.
2. Align stakeholders to a common direction.

### Activities
- Host workshop to gather target network Future State requirements.
- Identify and define SIP strategies to optimize network communications costs.
- Review Current State and identify opportunities to optimize costs on network current vs. future state with network evolution project.

### Deliverables
Draft IT Network Optimization Business Case and Phasing:
- Documents the structure of the project’s final deliverables.
- **PRESENT RECOMMENDATIONS TO STAKEHOLDERS FOR THEIR FEEDBACK.**

### Key dependencies:
- Participation of key stakeholders in Workshop.
- Accurate initial view of their Communications Strategy.
- Complete knowledge of system costs.
Example Deliverable: **Network OPEX**

<table>
<thead>
<tr>
<th>Current Mode of Operations</th>
<th>1,590</th>
</tr>
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<tbody>
<tr>
<td>PRI</td>
<td>552</td>
</tr>
<tr>
<td>T1</td>
<td>184</td>
</tr>
<tr>
<td>Phoneline</td>
<td>112</td>
</tr>
<tr>
<td>LD</td>
<td>50</td>
</tr>
<tr>
<td>Other</td>
<td>95</td>
</tr>
<tr>
<td>Data</td>
<td>308</td>
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<tr>
<td>Tax</td>
<td>109</td>
</tr>
<tr>
<td>Regulatory</td>
<td>180</td>
</tr>
</tbody>
</table>

**Current State**

- **51%** SIP Based services vs. TDM with PRI Benchmark Rates.
- **85%** Elimination of Inter-PBX T1s (collocated with Metro E)
- **82%** Eliminations & Rate Benchmark. From 168 Phone lines reduced to 52 based on their specific Location and move to SIP
- **0%** DATA Spend (DSL, Metro E, MIS) No Change
- **42%** Reduction relative to usage

**Recommended Future State**

Future Mode of Operations

- **$743K** Reduction per Year
- **SIP** 270
- **T1** 48
- **Other** 54
- **Data** 308
- **Tax** 63
- **Regulatory** 104

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Example Deliverable: **SIP Roadmap**

Removing the Roadblocks to SIP & Capital Expense

- **SIP Enable the Core**
- **SIP Enable the Edge**
- **Service Provider Analysis and Actions**
- **Monitor & Control**

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Example Deliverable: **SIP OPEX Savings**

### Cumulative OPEX Outlook

<table>
<thead>
<tr>
<th>Type</th>
<th>Yr1</th>
<th>Yr2</th>
<th>Yr3</th>
<th>Yr4</th>
<th>Yr5</th>
<th>Yr6</th>
<th>Yr7</th>
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</thead>
<tbody>
<tr>
<td>OPEX trendline - Present Mode</td>
<td>$1,589,672</td>
<td>$3,179,344</td>
<td>$4,769,017</td>
<td>$6,358,689</td>
<td>$7,948,361</td>
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<td>OPEX trendline - Future Mode</td>
<td>$846,672</td>
<td>$1,693,344</td>
<td>$2,540,017</td>
<td>$3,386,689</td>
<td>$4,233,361</td>
<td>$5,080,033</td>
<td>$5,926,705</td>
</tr>
</tbody>
</table>

Numbers above do not account for Network Maintenance fees, inflation or expected growth.
An Example of Priorities and change...

It was here.....

Then it went there...
The Project
A NORMAL PROJECT FLOW......

- Implementation Kick-off (gathering the troops)
- Technical Assurance (all parties present and accounted for)
- Dial Plan is the Devil
- BIC Requirements / Site Readiness (Important)
- Order the Circuits (Why now?)…3+ months
- Test and Turn – Up (Carrier Side)
- IP – LAN/WAN Circuit testing (Including redundancy)
- Carrier Dial Plan Testing (Intra, Local, Long, 911, FAX)
- Port Non-Critical Numbers first (spare DID Range)
The Importance of Session Boarder Controllers
SBC: SIP Trunking Architecture

Ports:
SIP Signaling - 5060 TCP or UDP (your choice)
RTP Media – 35,000-45,000 default (or other specified range of choice)

Ports for Mgmt I/F:
HTTPS - 443/tcp  EMS
OpenVPN - 1194/udp  EMS
SSH - 222/tcp  EMS
NTP - 123/udp  EMS= if NTP server is used
Syslog - 514/udp  EMS= if syslogs are used
SNMP - 161+162 or other/udp (if SNMP is used)
DNS - 53/udp for dns and the signaling and media ports (if names are used.)

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And Then There is the **Other** Side of SIP
SBC: Remote Worker Architecture

Ports:
- SIP Signaling - 5060 TCP or UDP (your choice)
- RTP Media – 35,000-45,000 default (or other specified range of choice)
- HTTPS – 443/tcp (for endpoint certs and PPM files)
- DNS – 53/udp for dns and the signaling and media ports (if names are used)

Enterprise Voice

Ports for Mgmt I/F:
- HTTPS - 443/tcp
- OpenVPN - 1194/udp
- SSH - 222/tcp
- NTP - 123/udp if NTP server is used
- Syslog - 514/udp if syslogs are used
- SNMP - 161+162 or other/udp (if SNMP is used)
- DNS - 53/udp for dns and the signaling and media ports (if names are used.)

DMZ

Internet

Remote Workers

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Remote Worker: How does the SBC proxy endpoint traffic?

1. Encrypted signaling over TLS
2. Signaling over TCP/UDP
3. Encrypted media SRTP
4. Media RTP

Unencrypted Signaling: SIP/TCP
Unencrypted Media: RTP

Encrypted Signaling: SIP/TLS
Encrypted Media: SRTP (HW 50 usec)
Questions?

Thank you!

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