

# City of Sacramento VoIP Deployment Project

Presentation to State of California  
IP Telephony Working Group

# Project Scope

- To Convert 4000+ SBC Centrex analog lines to City owned and operated VoIP Phone System
  - Conversion from over 6 different Key Systems and traditional PBX technology, as well as multiple single line sets



# Project Initiatives

- To realize overall savings in Telecom costs, while taking advantage of new technology features.
  - Cost Savings initial assessment = ~\$20/phone per month or ~\$1 Million Annually
  - Cost Savings Actual = ~\$10/phone per month or ~\$500,000 Annually
    - ✓ Savings do not reflect additional labor costs (2 FTE)
    - ✓ Savings include a technology refresh program
    - ✓ Savings will be realized at full deployment
  - Soft Savings realized through efficiencies not included in actual \$\$ savings
    - ✓ Moves / Adds / Changes (speed, hard \$, efficiencies)
    - ✓ Employee Productivity

# Current Project Deployment Status

- First Pilot VoIP deployed in June 2001. First Production Site on VoIP in October 2001.
- Approximately 2300 VoIP phones and 200 Fax Gateways have been deployed.
- Remaining deployments include Public Safety (Police and Fire) and smaller remote sites.
- Multiple VoIP related applications also deployed:
  - IP Call Centers (6)
  - Voicemail (3800 Mailboxes, 8 Call Trees)
  - Overhead Paging

# System Architecture & Decision Criteria

- All Cisco VoIP System w/following key components:
  - Cisco Call Managers
  - VG248, FXS and ATA gateways
  - 7940 & 7960 VoIP handsets
  - PRI Gateways
  - Catalyst 35xx PoE Network Switches
  - All cabling passes CAT5e standards (specifically crosstalk signal – some CAT5 can pass these standards)
- All City Network Infrastructure and Telephony Applications are Cisco. Efficiencies in support, design and purchasing by using single vendor.

# Features / Benefits Expected

- The following features are watched and measured as actual realized benefits:
  - Faster more efficient MAC's (plug and play)
  - Lower Costs (hard \$ savings)
  - Number Plan Flexibility (City Controlled)
  - On-Net 4 digit dialing, with no distance charges
  - Single phone system easier administration
  - Other IP Telephony Technologies
    - ✓ IP Call Centers
    - ✓ Unified Messaging
    - ✓ Wireless VoIP (Future)

# Staffing

- Telecom vs. Network Staff
  - Combined units under same Division Manager before deployments began
  - Discussions on Roles / Responsibilities & Crossover tasks
- Added 2 FTE to support both deployment and ongoing support
  - Discussions with staff and upper management on impact of becoming “own phone company”

# Lessons Learned

## (staffing)

### Technical Support

- ❖ 2 FTE's not enough to support both deployment and ongoing support – needed to augment about half-way through deployment
- ❖ No “true” 24x7 support available
- ❖ 2 FTE only covers VoIP System, not additional IP Telephony Applications (i.e. Call Centers, Voicemail, etc.)

### Morale Issues (Telecom vs. Data Network Personnel)

- ❖ Us vs. Them attitude
- ❖ Telecom staff being “phased out” with new technology attitude

# Lessons Learned

(staffing cont.)

Additional IP Telephony Applications initially were underestimated (i.e. # of Call Centers, time/duplication of resources to deploy)

- ❖ Staff Augmentation necessary for some Call Centers and Voicemail deployments
- ❖ Timing of VoIP phone deployment w/IPTel application became burden to customer

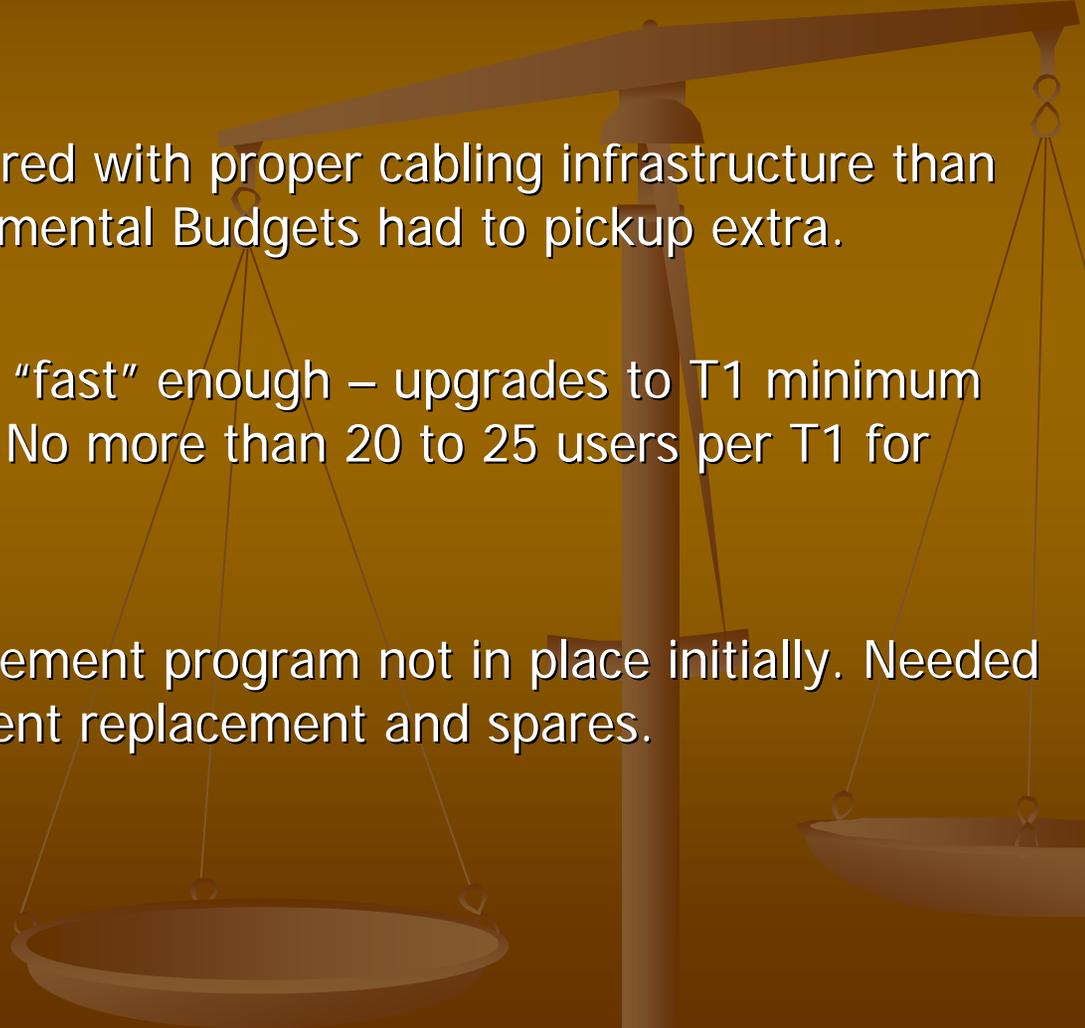
## Training

- ❖ Initial Training of Levels 1 thru 3 staff
- ❖ Keeping Up-to-Date with latest technology and major enhancements

# Lessons Learned

## Costs

### Infrastructure Costs

- ❖ More sites not prepared with proper cabling infrastructure than anticipated – Departmental Budgets had to pickup extra.
  - ❖ Some WAN links not “fast” enough – upgrades to T1 minimum necessary for some. No more than 20 to 25 users per T1 for VoIP.
  - ❖ Infrastructure replacement program not in place initially. Needed program for equipment replacement and spares.
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# Lessons Learned

## 911 Services

### Current Solution

- ❖ FXO for each location with Centrex / Analog line directly connected and ANI / ALI services tied.
- ❖ VoIP Phones configured for physical location and 911 calls go out that locations FXO

### Limitations in Design

- ❖ Call Back – Due to single line and ANI / ALI for each location, only single call back number – not “actual” number 911 dialed from
- ❖ Phone Moves – if the phone is moved to a different facility it must be reconfigured for 911 services
- ❖ Administration / Monitoring – Multiple FXO modules need to be monitored and periodically tested to ensure reliability of 911

# Lessons Learned

## 911 Services (cont.)

### Options

- ❖ Direct update of CAMA database and all 911 goes through PRI Gateways.
  - Eliminates need for multiple FXO
  - Much less expensive solution
  - Phone moves still a problem and increased administration
- ❖ Cisco Emergency Responder
  - ANI / ALI is tied to switch port instead of phones – eliminates phone move problem
  - More information in ANI / ALI possible
  - Costs more

❖ Recommendation – Decide on solution and policy up front.

# Lessons Learned

## Misc.

### Power

- ❖ Backup Generators in Data Center and Larger Buildings
- ❖ Building UPS in Data Center and Larger Buildings
  - Smaller UPS in each closet
- ❖ "Power Fail" phones in key locations

### Vendor / Systems Integrator Management

- ❖ Actual vs. Marketed Skills
- ❖ Support Agreements
- ❖ Managing Multiple Vendors – Different approaches

### System Maintenance

- ❖ Downtime for major upgrades

# Lessons Learned

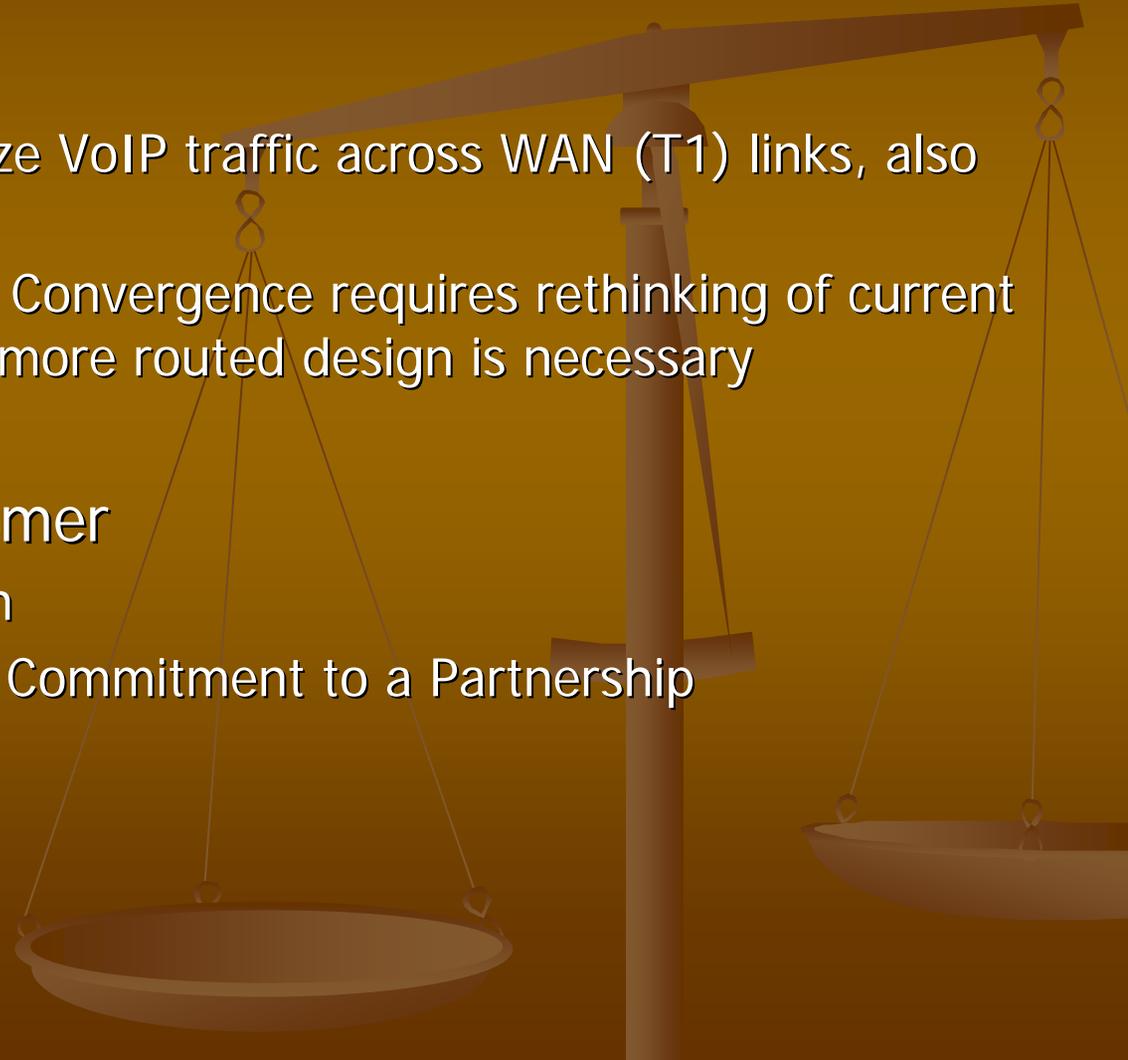
## Misc.

### Network Impact

- ❖ QOS is key – Prioritize VoIP traffic across WAN (T1) links, also on dedicated fiber
- ❖ Voice / Data / Video Convergence requires rethinking of current VLAN type design – more routed design is necessary

### Managing the Customer

- ❖ Clear communication
- ❖ Not just Buy-In, but Commitment to a Partnership



Q & A