



Leading Innovation: Hanford Enterprise VoIP



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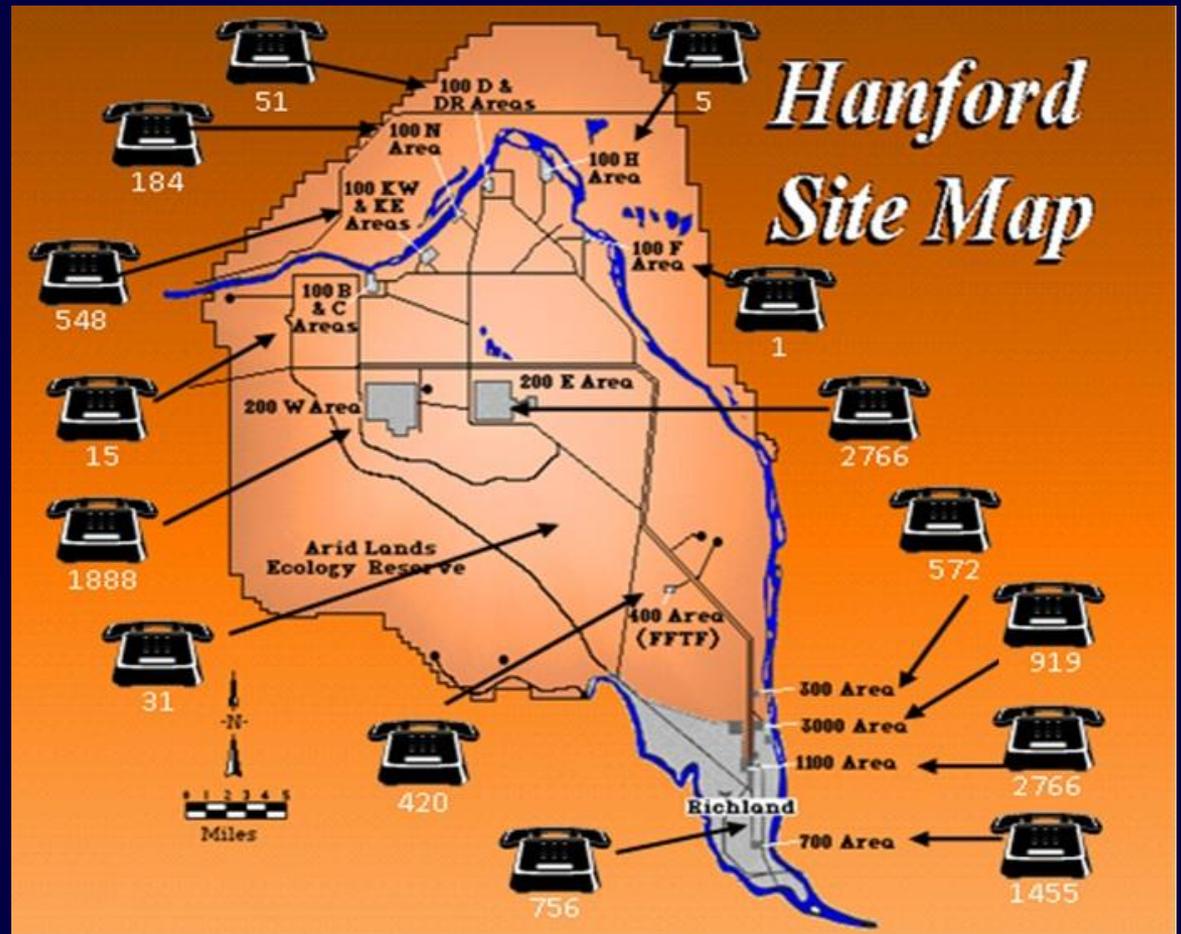
Background

- Large phone system
 - 11,000 analog phone lines
 - 500 special application circuits
 - Patrol/Fire/EMS 911 services
- Lucent 5ESS Analog Phone switch
 - Central Office with 5 nodes
 - Separate copper cable plant (OC-3, OC-12)
 - 20 year old system
 - Diminished vendor support



Environment

- 586 sq. miles
- Central Office in 3000 Area
- Nodes in 200W, 200E, 400, 1100, 700





Challenges

- Aging hardware with limited support
 - Rapidly expanding workforce
 - ARRA funding for expedited cleanup
 - Mobile workforce
 - Environmental impacts, Green IT
 - Short implementation window
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Solution

- Allow a single network to serve the needs for both data and voice
- Eliminate the need for additional cabling for new facilities
- Consolidate IT facilities
- Re-purpose Central Office for records storage
- Meet Green IT goals





Solution

VoIP Technology Overview

- Plain Old Telephone Service (POTS)
 - Low bandwidth with no mobile capabilities
 - Largely unchanged for 50 years
- Voice over Internet Protocol (VoIP)
 - Voice over Internet Protocol converts analog audio into a digital format so it can easily be transported over a data network
 - Can be used on both wired and wireless IP data networks





Solution

Qualitative Benefits

- VoIP produces productivity enhancing and customer service improving benefits that can have intangible effects on employees and customers.¹
- Productivity benefits include
 - Advanced multimedia
 - Conferencing tools
 - Detailed documentation/Call Reporting
 - Flexibility in phone system management and maintenance

¹Matthew Del Percio. Yankee Group DecisionNoteSM Market Intelligence. To Reduce Operating Costs and Drive Up Productivity, SMBs Must Rely on Trusted VoIP Vendors and Channel Partners. January 5, 2006.





Solution

Reliability

- Layered System
 - Redundant hardware and software create highly resilient and fault-tolerant system
 - Active – Active Cisco Communications Managers in separate datacenters
 - Redundant divergent routed network paths to each datacenter
 - Cisco PoE switches with UPS power to all VoIP phones





Solution

System Flexibility

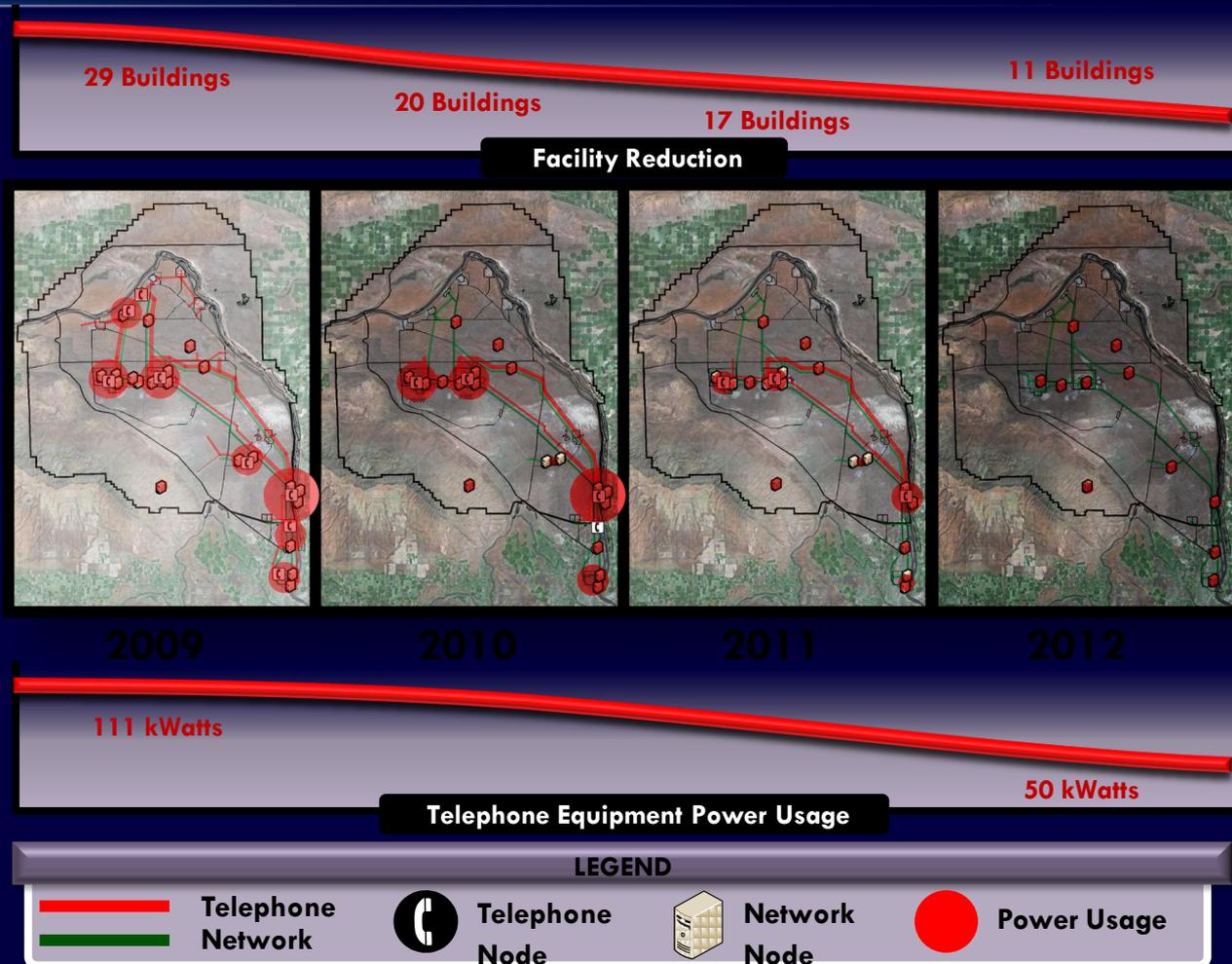
- IP Phones Anywhere
 - Leverage WiMAX wireless campus to connect IP Phone anywhere on Hanford Site
 - Converged Data and Voice into single device, IP phone with zero client using VDI
- Scalable phone system
- Emergency notification integration with AtHoc
- Voice in the Cloud



Solution

Green IT

- Reduced square footage from 1520sf to 18sf
- Power reduction of 885,000Kw/h per year





Transition to Enterprise VoIP

- Operations and Management
 - Availability
 - Hanford Specific Solutions
 - Special Circuit Integration
 - Analog handset Users
 - PBX Integration
 - Hosted VoIP Services
 - Test Environment
 - Deployment Process
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Operations and Management

- Network and Operations Security Center
 - Use of a companion suite of software to monitor data network and voice services
 - Cisco Unified Operations Manger Suite
 - Cisco Real Time Monitoring Tool
 - Cisco Operations Manager
 - Cisco Service Monitor
 - Cisco Statistics Manager
 - Cisco LAN Management Solution
 - EMC Ionix Network Monitoring Tools



Availability

- Maintain phone operation during power outage
 - Cisco Power over Ethernet (PoE) switches connected to Uninterruptible Power Supplies (UPS)
 - Use of non-VoIP analog handsets per building labeled as “Emergency” phones
 - Triple redundant divergent fiber ONS-15454 ring



Hanford Specific Solutions

Special Application Circuit Integration

- 500 circuits either directly integrated with 5ESS or on legacy telephony equipment
 - Cost prohibitive to transition to IP
 - Analog alarm circuits
 - Waste monitoring circuits
 - Emergency ring-down lines
 - Paging repeater circuits
 - AM broadcast circuits
 - Loop Telecom channel banks chosen as solution
- All DS1 and DS3 circuits transported on DDM OC-3 & OC-12 replaced with Cisco ONS15454 OC-48 ring
 - New transport handles PRI's to Cisco Gateways for long distant trunks, PBX circuits





Hanford Specific Solutions

Special Application Circuit Integration

- Additional 5ESS Special Circuits
 - 911 Trunks- Designed and tested redundant, physically diverse 2911 routers with VWIC-FXO cards
 - STE (Secure Terminal Equipment) telephones- Designed and tested L3 VoIP Conversion kits that are installed in STE phones to create a secure VoIP transmission. We also designed and tested Adtran Atlas 550 equipment to support ISDN fed STE phones that could not be converted to VoIP in certain secure areas.
 - VTC (Video Tele Conference) - Designed and tested Adtran Atlas 550 equipment to support site VTC equipment that only supported ISDN (Integrated Services Digital Network) circuits.



Hanford Specific Solutions

Analog Handset Users

- Not every phone could be replaced with an IP phone
- Utilized Cisco Analog Voice Gateways (VG-224)
 - Placed in existing facilities with redundant network connections, UPS and SONET failover
- Utilized as “Emergency” lines in case of power failure
- Fax and Modem lines





Hanford Specific Solutions

PBX Integration

- Connecting DOE subcontractors not using Hanford Network
 - Connected existing PBX's to Cisco Communications Manager
 - Maintained Caller-ID
 - No cost transition





Deployment Process

Deployment Method

- Conducted in phases across the Hanford Site
 - Each major area treated as a phase (200W, 200E, 300, etc.)
 - Audit conducted to determine if facility was VoIP candidate (HLAN present, PoE switch)
 - If HLAN was present but no PoE switch, a new switch was placed in advance of the phones being deployed
 - UPS placed on each PoE switch sitewide
 - User needs audit conducted
 - Each user was visited and complete phone audit done
 - Correct make and model determined for each user





Deployment Process

Deployment Method

- Phone deployment
 - Phones were delivered (JIT) to each facility based on audit
 - Phones set-up real-time using Tool for Auto-Register Phone Support (TAPS)
 - Could deploy 120 phones per day
- Clean-up
 - Old phones recovered and e-cycled by Cisco
 - Cardboard recovered and recycled





Deployment Process

Training and Communications

- Communications
 - General Delivery email and newsletter articles
 - Visit from VoIP team member
 - Each user received a minimum of three emails
- Training
 - Group and Individual training sessions
 - Webpage resource
 - FAQ, User Guides, Instructional Videos, Deployment Progress



Conclusion

- Lessons Learned
 - Strong VoIP team is critical
 - Communication with end user is paramount
 - Standardized and streamlined phone deployment method is critical to success
 - Pilot should include deploying phones
 - Category 3 cabling was no issue
 - Fax machines are not designed to work on VoIP
 - Impacts of “Network” outages much more invasive and visible
 - End users really like their rainbow handset cords...





Q&A

