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## Best Practices Followed & Learned – Live Data Center Upgrades

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# Background

- **25 Year Old Center - Built by AT&T in 1984**
- **Main Frame Computer Center**
- **125,000 Gross Square Feet**
- **80,000 Square Feet of Data Center Space**
- **Tier III Data Center**



# Ready for Use in 90 Days

- **Leverage Investment – Good “Bones”**
- **90 days to Complete the Following:**
  - **Audit and Evaluation of Major Systems**
  - **Coordination Study and Testing**
  - **Conversion of 3 wire panels to 4 wire**
  - **New Raised Floor and Ceiling**
- **Collocation & Managed Services – January 2008**



# One of the "Good Bones"





# The Next 18 Months

- **Upgrade Mission Critical Components in a Live and Rapidly Growing Center**
- **Keep Customers Informed**
- **Downtime is Not an Option**



# Mission Critical Upgrades

## Cooling Systems

- Towers
- Air Handlers
- Chillers

## Power

- UPS
- Distribution Expansion
- Power Quality Meters (PQM)

## Building Management System



# Cooling System Improvements

- **Replace All Cooling Towers**
  - Coordinated replacement
  - Cool weather scheduling
- **Replace 33% of Air Handling Units**
  - Selection based on increased capacity and lower operating cost
  - 50% improvement in capacity within same footprint
  - XCEL rebate and reduced operating cost



# Cooling System Improvements

- **Replace 67% of Chiller Plant**
  - Improve Efficiency
  - Increase capacity to meet growth plans
  - XCEL rebate and reduced operating capacity



# Cooling System





# Power System Improvements

- **Replace Teledyne UPS**
  - **300% Increased Capacity**
  - **Competitive Evaluation of Vendors**
  - **Live Transition from Existing to New**
  - **Resulting Design = Dual “A” and “B”**



# UPS Upgrade





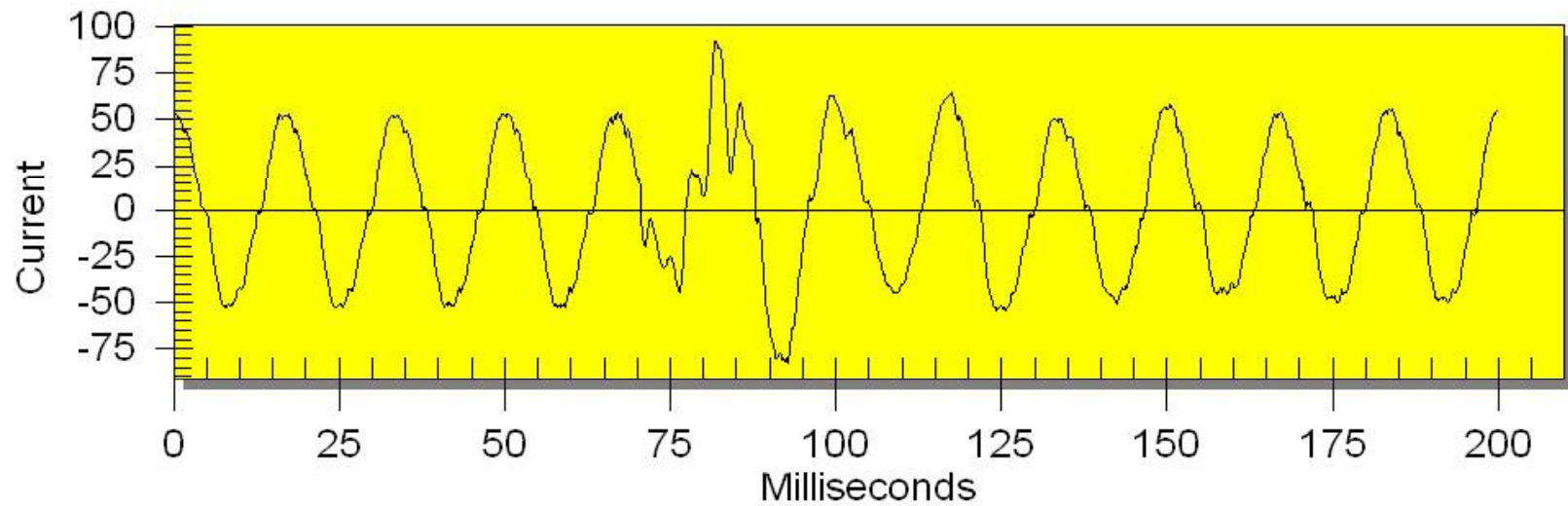
# Power System Improvements

- **Expanded Distribution Panels**
  - Code Allowed – 225 Amp 84 Circuit MLO
  - Branch Circuit Monitoring System on all circuits
- **Installed Power Quality Meters on Dual Utility Feeds**
  - Real time data and Waveform capture



# Power Quality

Phase A Current  
128 Points / Cycle





# Building Management System

- **Replace Existing System**
  - Selection/Evaluation of Competitive Solutions
  - Focus on Mechanical Systems Control
  - Live Transition from Existing to New
  - Greatly Expanded Free Cooling Hours
  - Improved Operational Metrics and Trending
  - Real Time PUE/DCE



# Best Practices - Followed & Learned

- **Growth Presents Opportunities**
  - Build a Road Map – 3 Year Forward Looking
  - Forecasted Capital Spending
- **Leverage Good Design Attributes**
  - Forward Looking Requirements
  - Surround with Strong Engineers
  - Transferable to Other Centers?
  - Up-to-Date One Lines



# Best Practices - Followed & Learned

- **SOP's and MOP's!**
  - **Plan for the Unexpected**
  - **Keep the Customer Informed**
  - **Review, Double Check and Execution**
  - **Back out Planning**
- **Robustness Initiatives = Efficiency Gains**



# Best Practices - Followed & Learned

- **Contractor Management is Critical**
  - **We are the Boss; Our Rules Apply**
  - **If Not in the MOP, Ask Before Proceeding**
  - **Recurring Project Plan Progress Reviews**
  - **Watch for Complacency**



# Questions