

University of Texas at Austin

Upgrade and Standardization of
Control Systems for Campus
Infrastructure

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Agenda



UT Austin Campus Cooling

CHW Control Systems Evolution

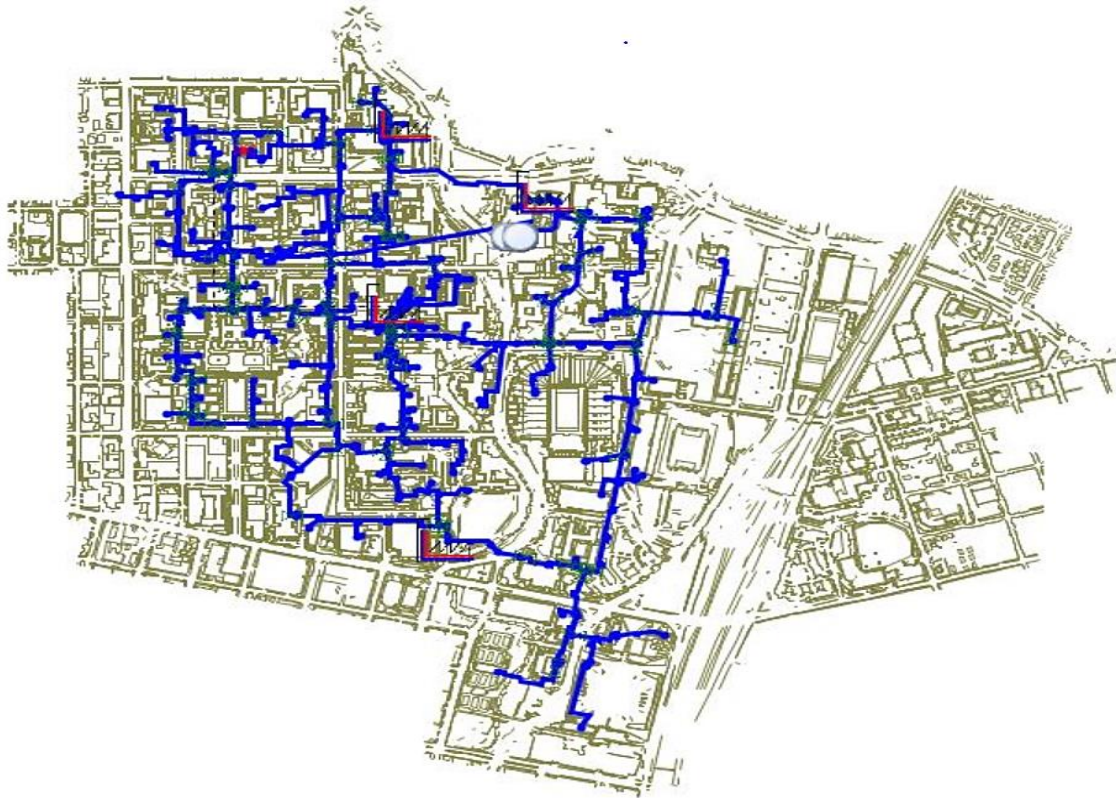
Approach and Solution

Summary

Q & A



UT Austin Campus Cooling



- Main Campus District Cooling Capacity of 44,000 Tons
- Main Campus Peak Load of 33,000 Tons
- Satellite Plants for Research Campus
- Presently Building Chilling Station and TES for new Medical District

CHW Loop Control Systems Evolution

- Networking
- PLC Infrastructure
- Human Machine Interface
- Control Strategies



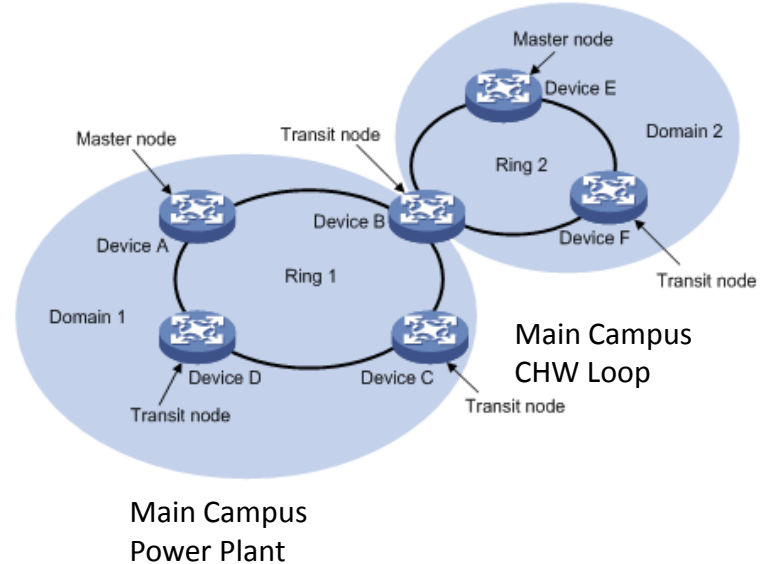
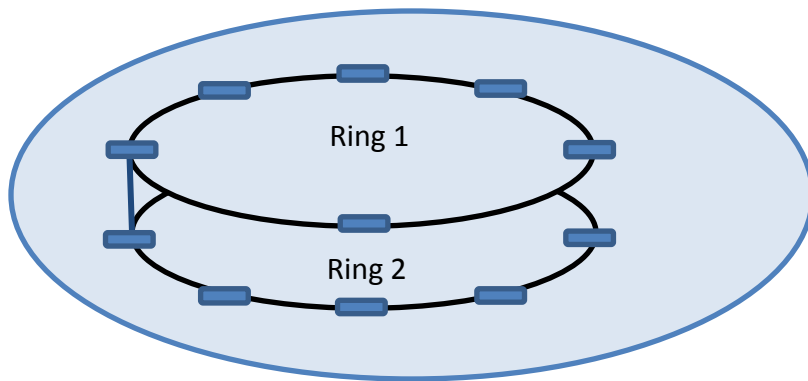
Two Concentric Fiber Optic Rings:

Included both Power Plant and Chilling Station



Two independent self-healing Fiber Optic Rings:

Power Plant and Chilling Station

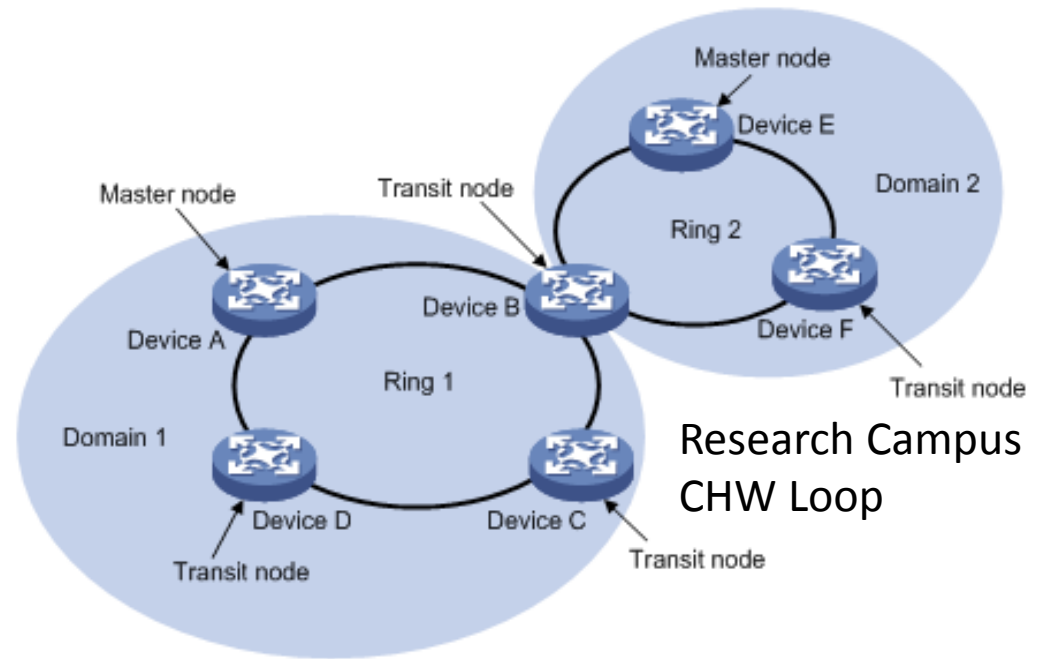


Network Topology

DWDM – Remote Chilling
Station Control

DWDM – Dense-Wavelength-
division-multiplexing works by
combining and transmitting
multiple signals
simultaneously at different
wavelengths on the same fiber.

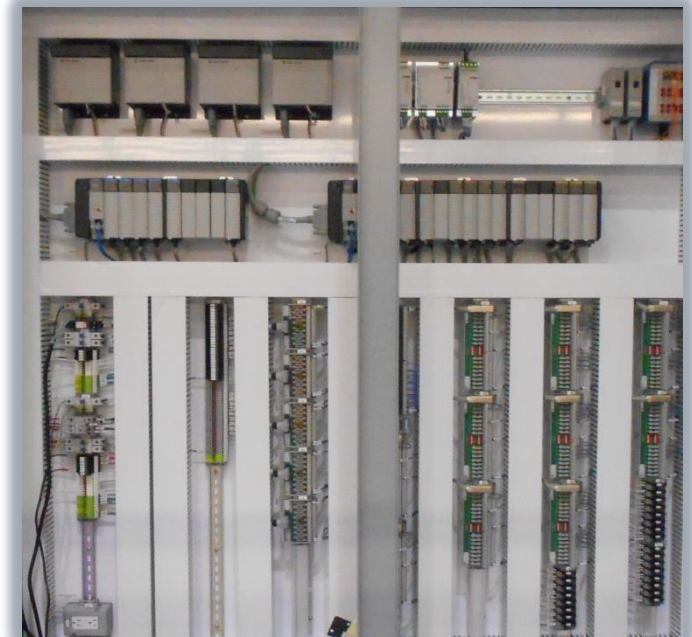
In effect, one fiber is
transformed into multiple
virtual fibers.



Main Campus
CHW Loop

Network Topology

- Robust PLC Architecture design was incorporated to eliminate single points of failure which would cause complete major shutdown of chilled water systems.
- Controller Logix L5X/L6X processor upgraded to L7X Processors for additional memory and processing speeds to accommodate Rockwell Plant-PAX™ objects.
- Redundant Processors utilized to increase system reliability.
- Redundant Ethernet IO communications implemented utilizing Device Level Ring.



PLC Infrastructure

Stand Alone Workstations were upgraded to Client-Server Environment:

- Redundant Virtualized HMI servers .

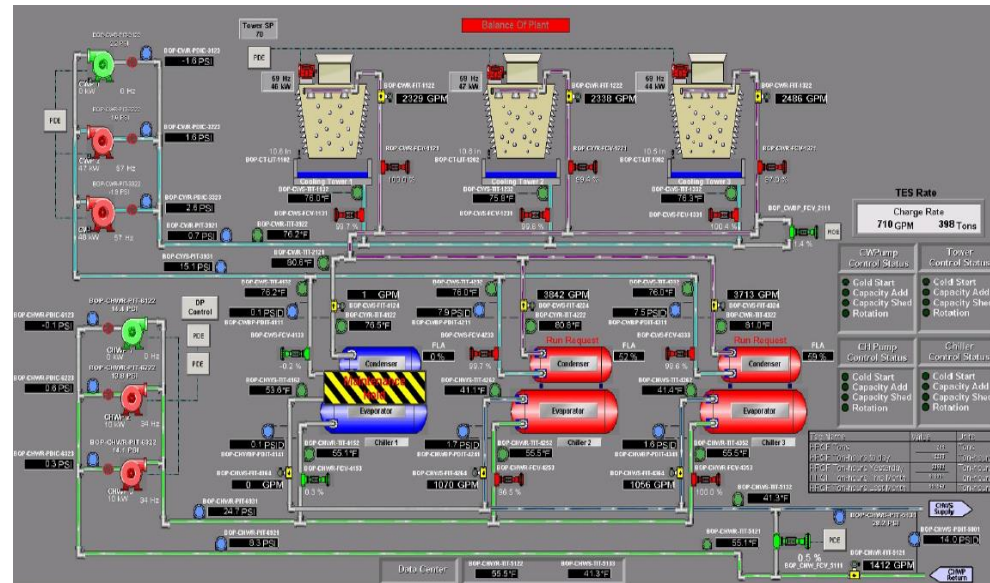
VMware ESXI Host #1

- Domain Controller
- Factory Talk Server
- Factory Talk Data Server

VMware ESXI Host #2

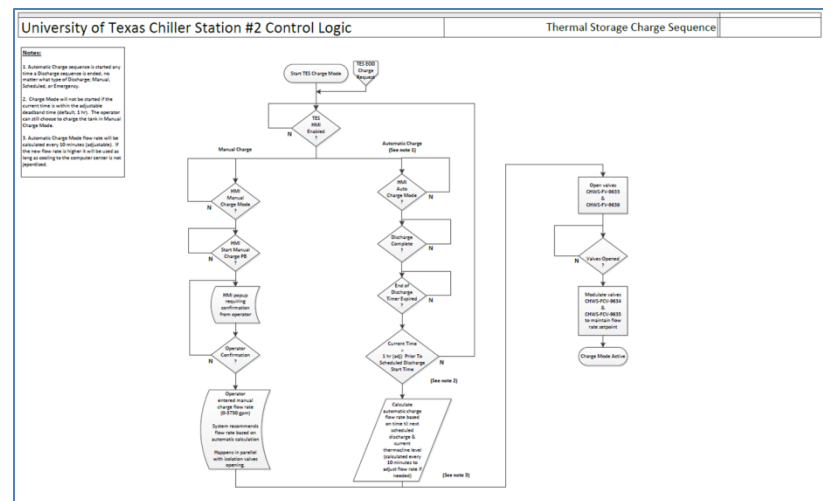
- Factory Talk Directory
- OPC Server

- Ability to pull data from Servers to avoid “taxing” controllers
- Clients located in all Central Stations
- HMI changes are seamless and performed “on the fly”



HMI Infrastructure

- SAMA Drawings



Control Strategies

Existing Control System – Remote Campus CS

Challenges

- Operation located 10 miles away
- Control system was not fully automated
- PLC programming configured somewhat incorrectly
- Issues with Interfacing Equipment
- No sequencing

Remarks

- Integrated Programming Solution – Team work
- Equipment Interface Critical for success
- Developed Control Sequences based on SOO's
- Plant Simulator
- Unmanned Operation



Medical District Thermal Energy Plant – A New Approach



- **Project Team**
 - Controls engineering part of design team
- **Latest Control Technology Utilization**
 - Processor sized according to IO and fully redundant
 - Native controller communications
 - Expand CHW-Loop Control Network
 - OEM Equipment Interface
- **Design Criteria**
 - Design programming to follow SOO's
 - Latest Software
 - Identification of Process Variables
 - Best Practices – Plant Simulator
- **New Server and Network**
 - Virtualization
 - Part of CHW Loop Client/Server HMI

Summary

- **Understand Future Infrastructure Plans – key for success**
- **Standardization of Plant Control System**
- **Reliance on Sequence of Operations**
- **OEM interfaces**
- **Hardware and Software Factory Acceptance Tests**
- **Simulator used for Testing and Training**



Q & A

