SCADA Master Plan

Implementation Update

Chad Beck
Smart Utility Program Manager

April 1st, 2021

Agenda

1. SCADA System Background
2. Master Plan Goals
3. Implementation Phases
4. Capital Budget

What is SCADA?

Supervisory **C**ontrol **a**nd **D**ata **A**cquisition

- Remotely operate geographically dispersed equipment
  - 32 Water sites
  - 48 Wastewater sites
  - 11 Storm/Surface Water sites
- Gather and store data for system feedback and analysis

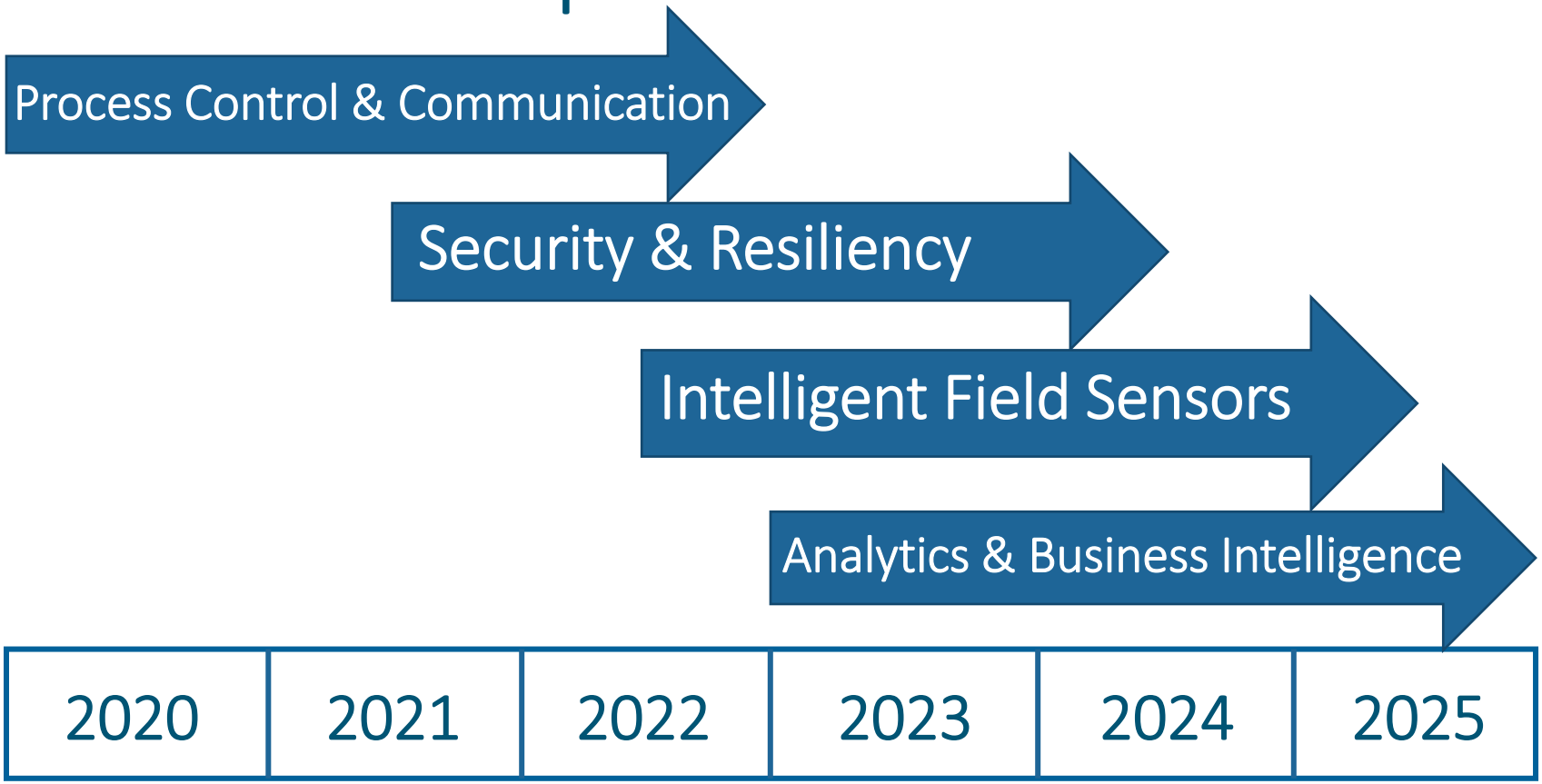
SCADA Master Plan

Goals of Planned Upgrades:

1. Increase critical infrastructure resiliency & redundancy
2. Ensure critical infrastructure cybersecurity
3. Improve quality of Utility services
4. Advance Bellevue's 'Smart City' vision within the Utilities Department

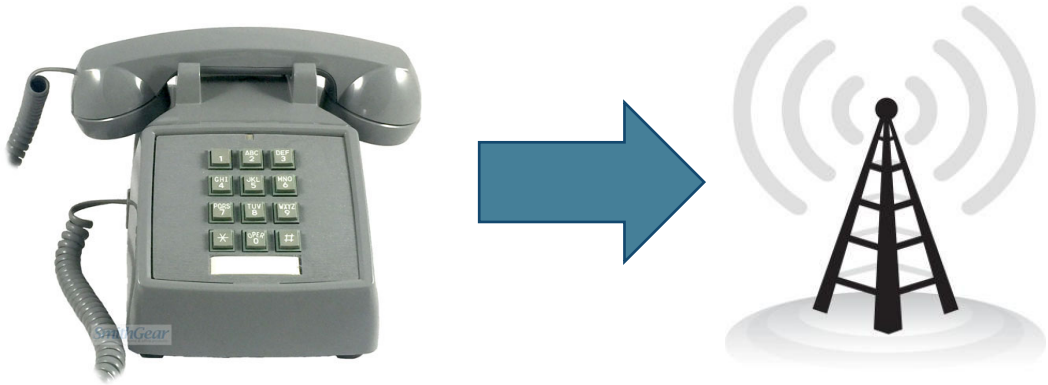
SCADA Master Plan

Four Phased Implementation



Phase 1: Process Control & Communication

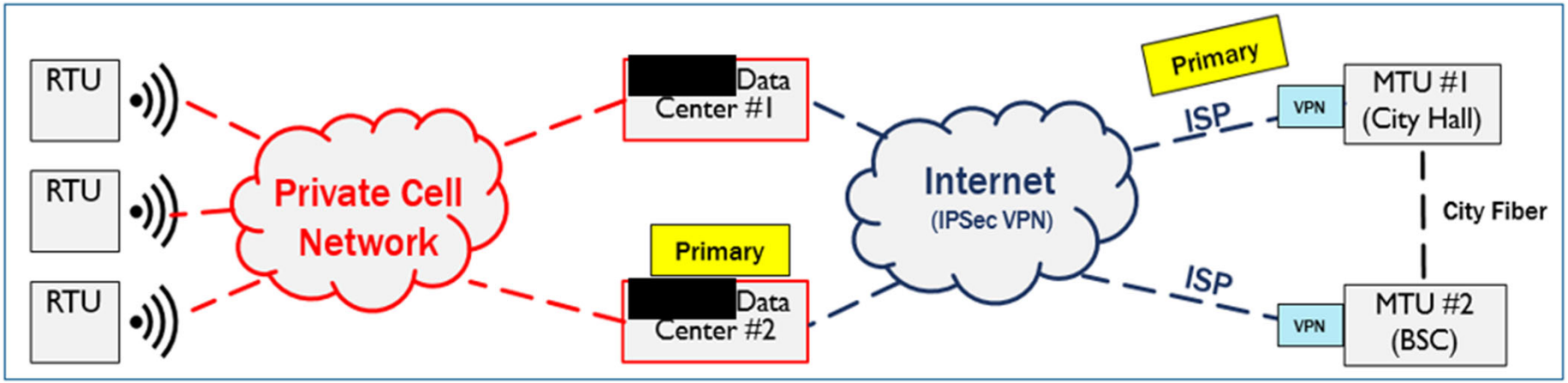
1. Establish secure, private cellular network for City of Bellevue Utilities SCADA system.
2. Convert process control hardware at remote sites from analog to digital.
3. Configure each remote site to communicate via the secure cellular network.



Phase 1: Process Control & Communication

Cellular Network Configuration
COMPLETE!

Established a private cellular network between remote sites and SCADA servers via a secure VPN “tunnel”.



*Data removed due to security reasons

Phase 1: Process Control & Communication

Cellular Network Buildout

Remote Computer & Cellular Upgrade Status

- Water: 32 Sites

- Wastewater: 47 Sites

- Storm: 11 Sites

Cellular Computer

Phase 2: Security & Resiliency

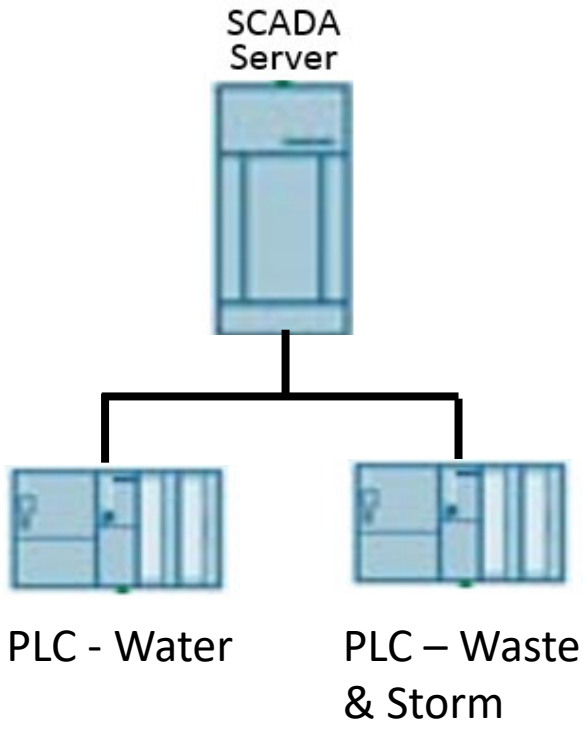
SCADA PLC & Server Redundancy

Current

- (1) Water PLC
- (1) Wastewater & Storm PLC
- (1) SCADA Server

Disadvantages

- No physical redundancy
- System must be down to do software updates and security patches



Phase 2: Security & Resiliency

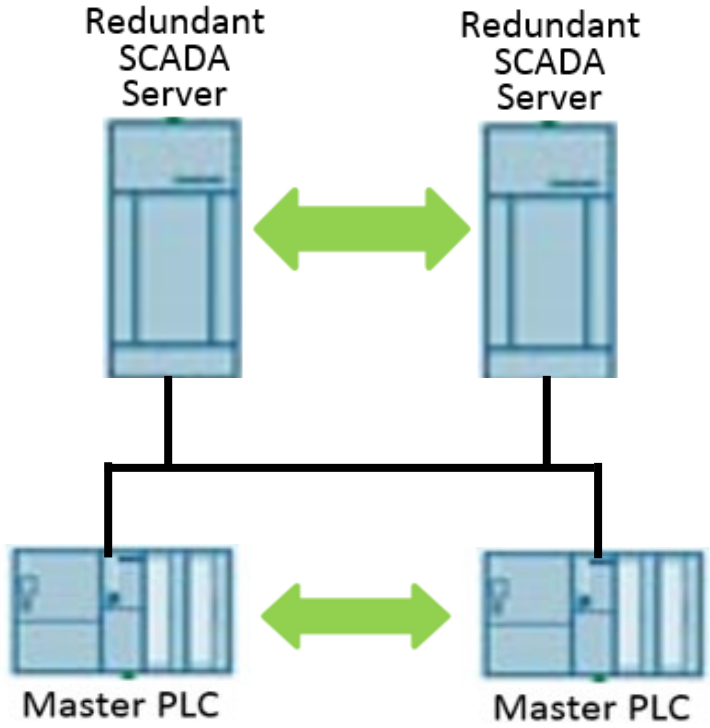
SCADA PLC & Server Redundancy

Future

- Two complete sets of PLCs and Servers at City Hall and Bellevue Service Center.

Advantages

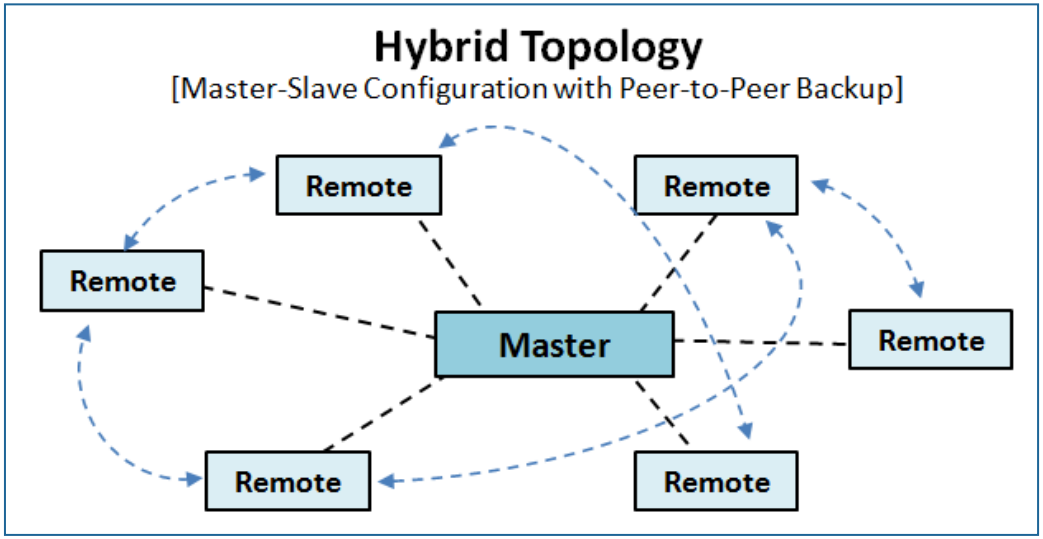
- Mitigates risk of failures.
- Able to load security patches on “standby” server without impacts to “live” server.
- Can reboot server without SCADA system downtime



Phase 2: Security & Resiliency

Create Hybrid Topology

- Data from all sites flows into the master unit
- Remote sites coordinate where necessary or advantageous
- Improved Resilience



Phase 3: Intelligent Field Sensors

Smart Motor Sensors

- Monitor pumping efficiency
- Calculate cost of pumping
- Automatically order replacement when performance indicates pending failure

- 69% of Water Stations
  - 26 motors remaining
- 5% of Wastewater Stations
  - 68 motors remaining

Phase 3: Intelligent Field Sensors

Flow & Pressure Monitoring

Flow Monitoring:

- 28 of 33 Water Stations
- 4 of 37 Wastewater Stations
- 0 of 11 Surface Water Stations

Pressure Monitoring:

- 1 of 147 PRVs has a pressure transducer
- No Wastewater sites monitor discharge pressure

Phase 4: Analytics & Business Intelligence

Smart City Initiatives

Incorporate and pilot software programs that provide:

- **Machine Learning & Artificial Intelligence**
- **Predictive Simulation**
- **Self-healing Systems**
- **Just-in-Time Asset Replacement**

SCADA Master Plan – Capital Budget