Industrial Process Controllers and Simulators

Topic 6

SCADA Systems

SCADA Systems

What is SCADA?

SCADA is an acronym for
Supervisory Control and Data Acquisition

SCADA systems are used to:

- monitor and control a plant or equipment in industries such as telecommunications, water and waste control, energy, oil and gas refining and transportation.

SCADA Systems

SCADA systems encompass the transfer of data between:

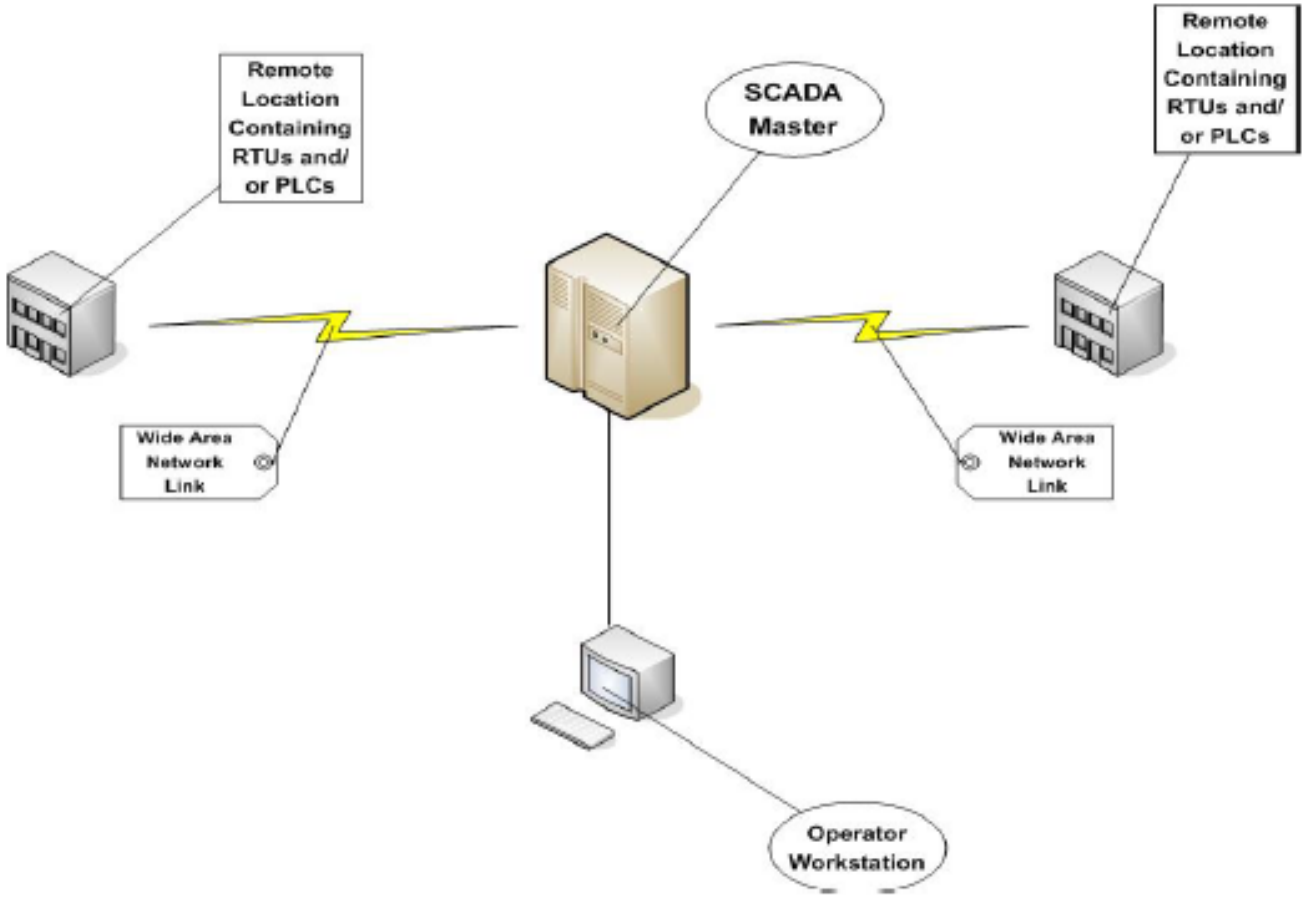
- a SCADA central host computer and
- a number of Remote Terminal Units (RTUs) and/or
- Programmable Logic Controllers (PLCs), and
- the operator terminals.

SCADA Systems

SCADA systems consist of:

- One or more field data interface devices, usually RTUs, or PLCs, which interface to field sensing devices and local control switchboxes and valve actuators
- A communications system used to transfer data between field data interface devices and control units and the computers in the SCADA central host. The system can be radio, telephone, cable, satellite, etc., or any combination of these.
- A central host computer server or servers (sometimes called a SCADA Center, master station, or Master Terminal Unit (MTU)
- A collection of standard and/or custom software (Human Machine Interface (HMI) software) systems used to provide the SCADA central host and operator terminal application, support the communications system, and monitor and control remotely located field data interface devices.

SCADA Systems

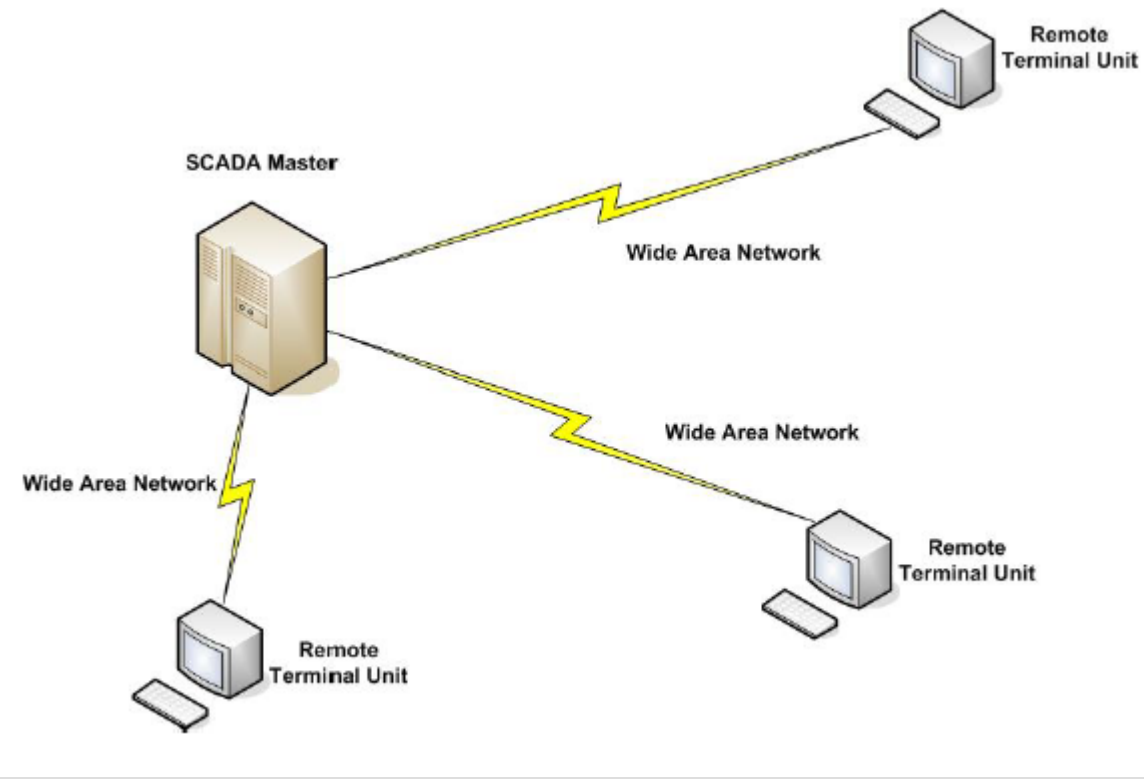


Typical SCADA system structure

SCADA Systems

SCADA architectures:

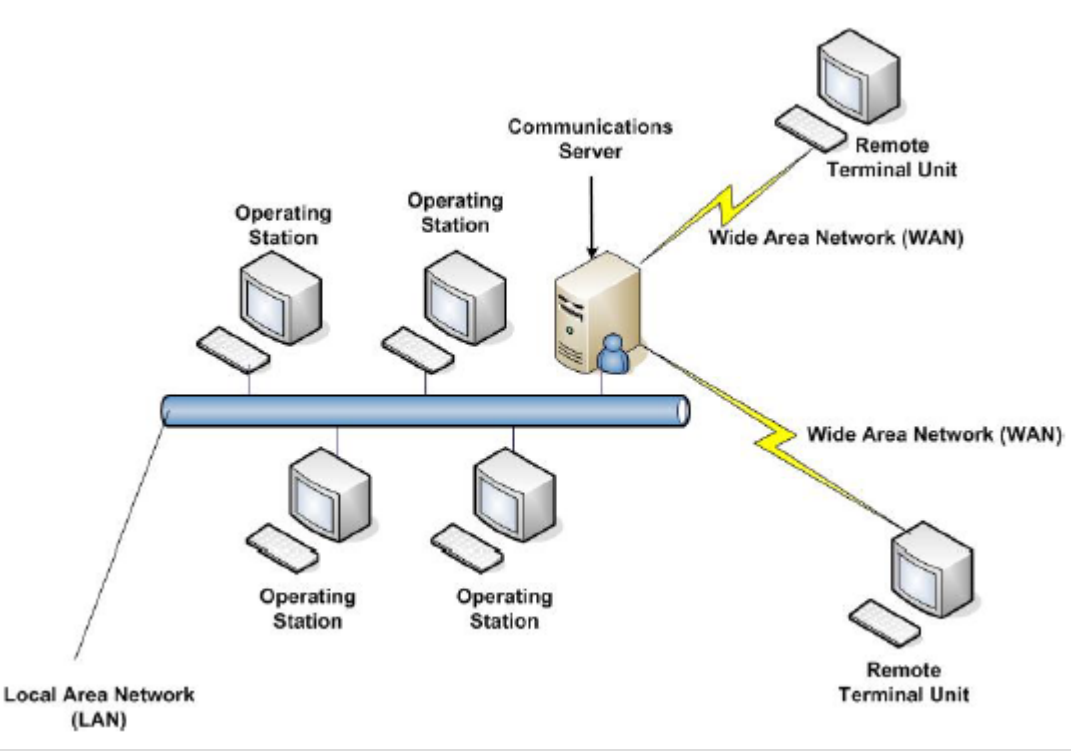
- First generation - centralized



SCADA Systems

SCADA architectures:

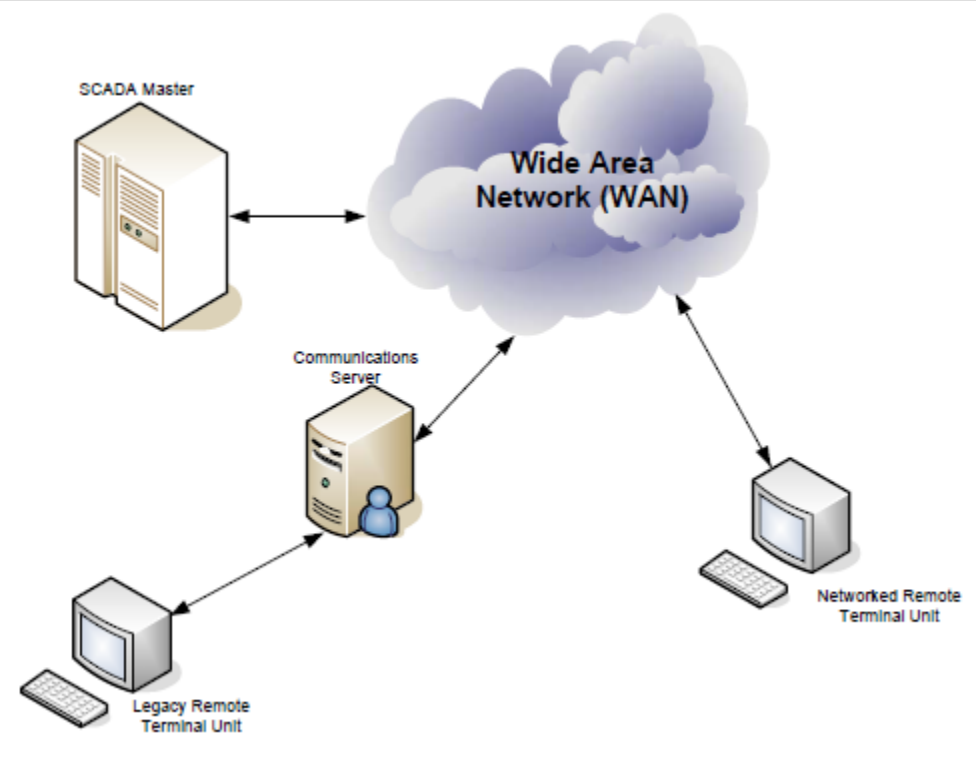
- Second generation – distributed



SCADA Systems

SCADA architectures:

- Third generation – networked



SCADA Systems

SCADA Functions

- Supervisory Control
- Data Acquisition
- Real Time Database
- Graphical Operator Interface
- Alarm Processing
- Data Historian/Strip Chart Trending
- Mapboard Interface

SCADA Systems

SCADA Principles of Operation

- Interface with Physical Devices
  - Remote terminal unit (RTU)
  - Intelligent electronic device (IED)
  - Programmable logic controller (PLC)
- Communications
  - Directly wired (typical for shorter distances)
  - Power line carrier (less common)
  - Microwave (very frequently used)
  - Radio (VHF, spread spectrum)
  - Fiber optic (gaining popularity)

SCADA Systems

SCADA Trends

- Open Protocols
  - – Open industry standard protocols are replacing vendor-specific proprietary communication protocols
- Interconnected to Other Systems
  - – Connections to business and administrative networks to obtain productivity improvements and mandated open access information sharing
- Reliance on Public Information Systems
  - – Increasing use of public telecommunication systems and the internet for portions of the control system

SCADA Systems

The End