

# SNS Control System - PLCs

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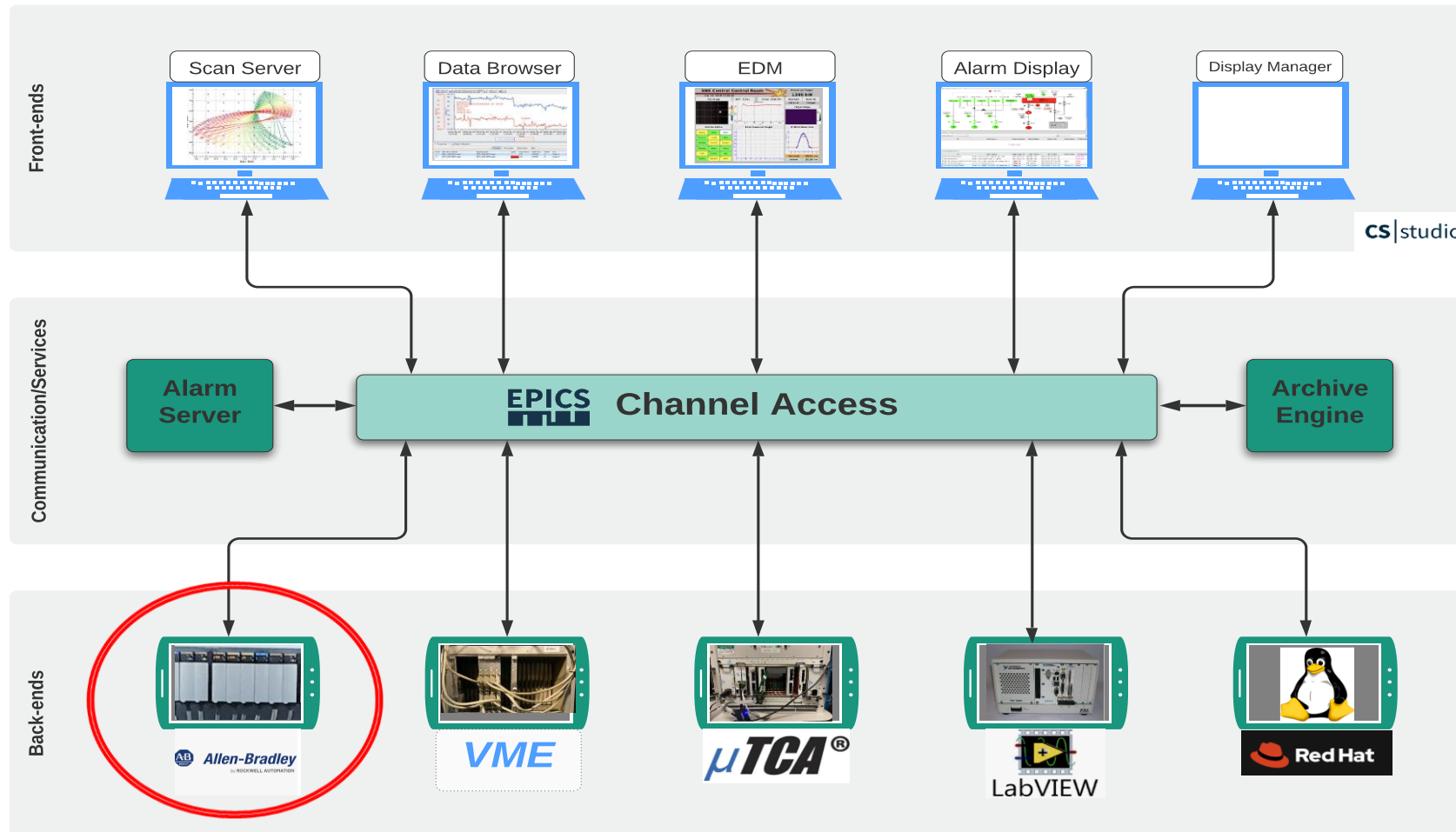
PLC Based Control Systems Workshop

ORNL is managed by UT-Battelle LLC for the US Department of Energy

# PLCs in SNS Control System

- SNS uses ~200 Rockwell Allen-Bradley PLCs for slow controls solutions
  - Vacuum
  - Cooling
  - Cryoplant and cryomodules
  - Conventional Facilities
  - Target and target utilities
  - Personnel Protection
- Tags are read into EPICS PVs to be available in the integrated control system

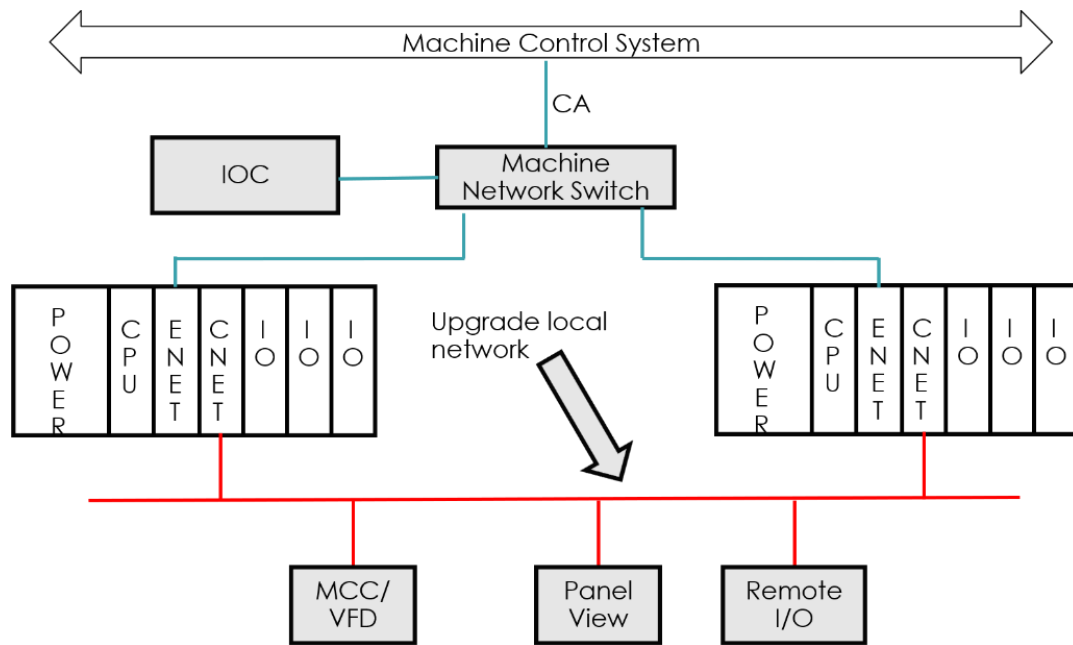
# SNS Integrated Control System Architecture



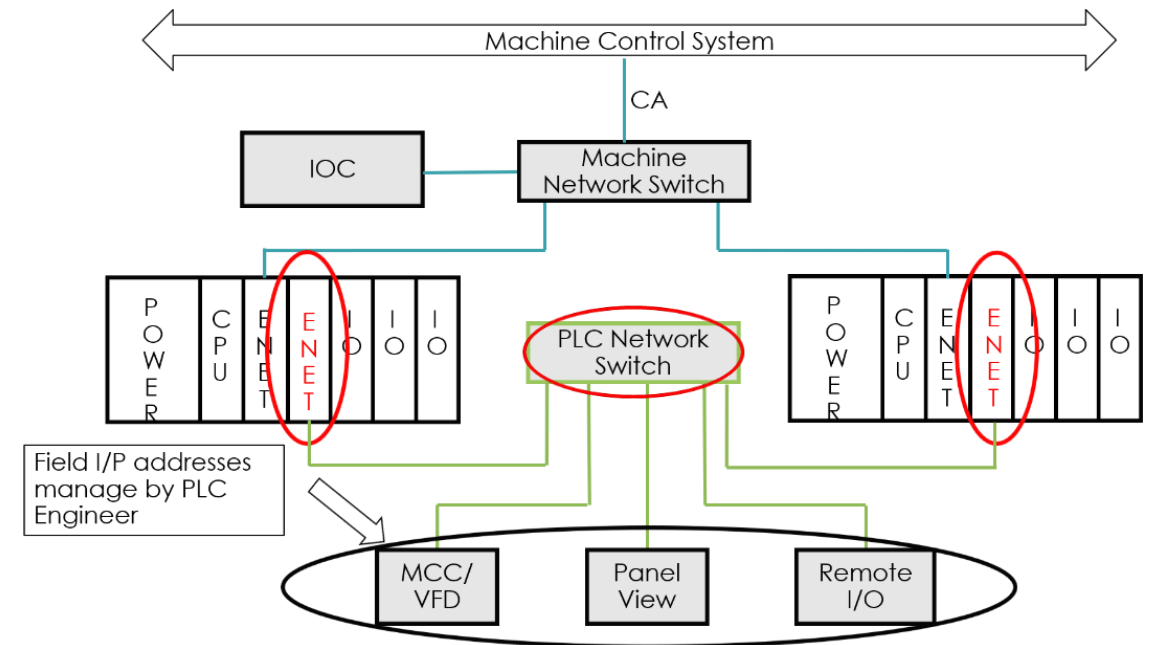
# Challenges

- SNS completed construction in 2006
- Most PLCs processors were replaced in 2009 due to manufacturing defects
- Systems that have not been subsequently upgraded use ControlNet or DeviceNet communication to devices then transfer tagged data to IOCs via Ethernet
- ControlNet is slow, nearing end-of-life, more costly to maintain
- DeviceNet obsolete but embedded in some equipment which also needs to be replaced
- Ethernet is now the industry standard

# ControlNet → Ethernet Example



System using ControlNet



Converted to Ethernet

# Planning for Migration

- Each time we upgrade a PLC based system, we change to all Ethernet communication
- Migration is labor intensive; need to update design documents and drawings, change programming, test, etc.
- Need to migrate all devices in a ControlNet cluster at the same time
- New Ethernet modules don't always fit into the old DeviceNet place when embedded in equipment; may need to replace device
- Must fit upgrades into schedule machine outage periods