CAN Over Ethernet Gateways
A Convenient and Flexible Solution to Access Low Level Control Devices

CAN @ CERN

- A recommended fieldbus at CERN
- Thousands of CAN nodes monitored and controlled from Front-End (FE) servers
- Technically challenging locations (strong magnetic fields, radiation areas)
- Long CAN cabling distance (> 100 m)
- CAN interfaces based on PCI and USB
- Communication via SIMATIC WinCC Open Architecture and OPC

Current Status and Limitations

- Co-location of FE servers and CAN interfaces for PCI or USB
- Rack space limitation
- Requires direct connection to a single FE server
- Prevents from virtualization and redundancy

Selection and Evaluation Methods

Needs?
- High density of CAN ports
- Rack mounted solution
- Independent CAN controllers
- Very high reliability
- Windows and Linux API

Wrapper DLL
- Maps API calls between existing OPC Servers and Anagate hardware.
- C re-entrant multithreaded library
- Transparent recovery mechanism in case of LAN/Power/CAN failures

Results

Performance
- The maximum load percentages are the thresholds at which no frames are discarded by the Anagate
- Maximum throughput corresponds to data provided by the company

Resilience
How well the hardware behaves?
- Power
- LAN
- CAN network

Usability - Web server provided for:
- CAN ports configuration
- CAN frames statistics (sent, received and discarded)
- Firmware update

Practical Experience in CMS DCS

- Integrated the Anagate gateways into the CMS DCS
- Tested with main CAN-based hardware (Wiener Power Supplies, crates, ELMBs)
- More than 54 billion CAN frames processed over a period of 4 months
- Very high reliability & robustness in production environment

Conclusions

- Good performance, stability and robustness
- External solution (no direct connection to the FE server)
- Web interface for online configuration and CAN frames statistics
- Viable alternative to PCI and USB interface types
- Enables evolution towards virtualization and redundancy
- Ongoing studies towards integration with OPC Unified Architecture