SIEMENS
Ingenuity for life

Capital Networks

Automated network design, optimization and verification enabled by accurate timing analysis

Benefits

- Advanced timing analysis assures consistency and delivery reducing development costs and risks
- Controls real-time system design across distributed teams
- Integrates network and software component architectures that ease the generation of consistent and complete ECU extracts
- Offers full design support for all major automotive network standard protocols such as CAN, CAN FD, LIN, FlexRay and Ethernet
- Manages a vast number of variants in a single design

Networks are a critical aspect of all modern vehicles. Their design is interwoven with the design of the electrical/electronics (E/E) architecture, software and the electrical systems.

Network design is not an isolated activity but rather a contributor in a collaborative, multi-domain workflow that spans requirements definition, architecture-, software-, electrical- and network design. Original equipment manufacturers (OEMs) are looking for model-based systems engineering (MBSE) solutions that are well-integrated and allow data to flow naturally between domains. When the domains are disconnected or poorly connected, there is an increased cost of ownership as migration of data is expensive.

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The E/E systems development flow has network design as an integral element. Siemens Digital Industries Software brings network-, architecture-, software- and electrical-system design under one holistic ecosystem with the necessary integrations.

Capital™ Networks software is a model-based network design and validation tool ensuring quality and accelerated network implementation. It helps OEMs design validated and correct networks that improve brand value by providing the essential tooling for designing, optimizing and verifying the networks and creating the electronic control unit (ECU) definitions that are sent from OEMs to Tier 1 suppliers. Capital Networks provide support for Ethernet, service-oriented architecture (SOA), scalable service-oriented middleware over IP (SOME/IP) and service discovery, all underpinned by timing analysis and validation.

Correctness by design

Capital Networks delivers high levels of design automation. Signals can be automatically packed into messages within the constraints of the captured timing requirements and user configurations.

The ability to automate time-consuming, error-prone tasks, such as manual signal packing, enables companies designing complex vehicles with highly distributed E/E architectures to:

1. Reduce network design costs and cycle times, accelerating the addition of innovative new features to their products
2. Respond better to competitive pressures and market demands by using design automation
3. Create more cost-efficient, highly sophisticated products without over-engineering the network design, whilst ensuring real-time communication behavior across distributed components

Such automated, generative message and frame packing enables design exploration, rapid network implementation as well as incremental change management.

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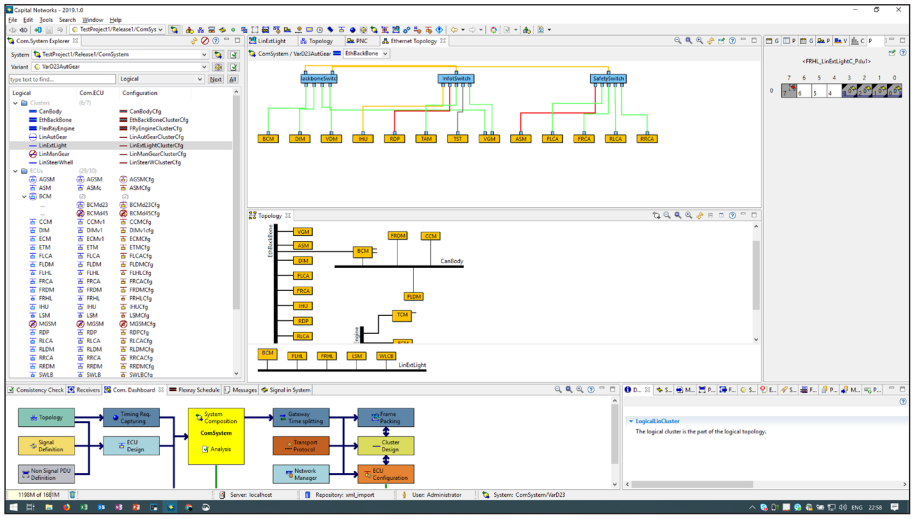
Timing requirements and analysis
Capital Networks is backed by a powerful, sophisticated mathematical timing model that provides timing analysis capability, which helps network designers ensure message delivery even in worst-case scenarios. Timing analysis enables the evaluation of communication timing against captured time requirements of network signals and assures correct real-time network communication by verifying timing requirements. These capabilities significantly reduce the need for physical testing during the design phase saving time and cost. The tool provides metrics for bus load, link utilization and end-to-end delay.

Advanced network design concepts
Capital Networks supports various advanced network design concepts that enables different automotive use cases:

- Support designing safety and security mechanisms such as end-to-end protection (E2E) and secure on-board communication (SecOC)
- Configure advanced concepts such as Network Management (NM), Partial Networking (PN) and transport protocols CAN-TP, FlexRay-TP, LIN-TP and DoIP
- Advanced Ethernet support for AVB, Global Timing Sync, switch configuration, SOME/IP and service discovery



Capabilities

- Imports and exports capabilities for major industry standards (ARXML, DBC, LDF, Fibex)
- Supports AUTOSAR versions 4.02, 4.03, 4.2.2 and 4.3.1
- A rich, customizable consistency checks framework with hundreds of predefined design rule checks to ensure correctness-by-design
- Supports automatic or manual signal and PDU gateway creation
- Tailor work flows and extend capabilities with the scripting interface and automate routine tasks such as report generation, DBC/LDF generation and ECU extract creation
- Generates ECU signal interface, timing analysis and supplier reports in different formats (Word, Excel) with a push of a button
- Offers variability support for all your vehicle variants. Focus on a generic superset design from which network designers can derive multiple vehicle platforms

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