



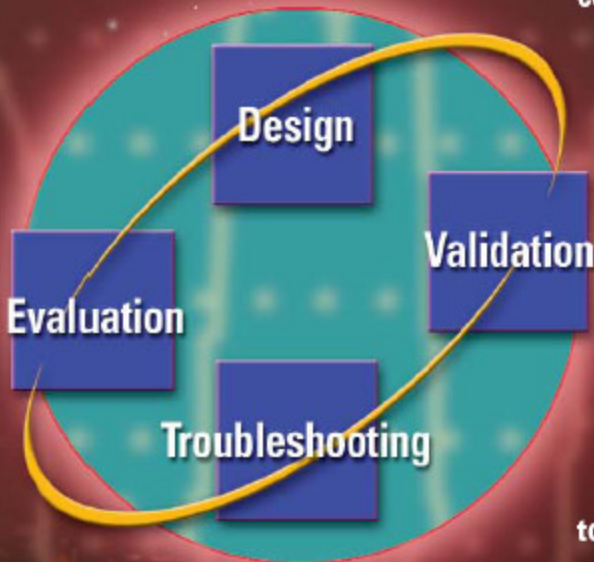
Industrial Network Services

Design, Validation,
Evaluation, and
Maintenance Services
for Optimizing the
Performance and
Reliability of
Control Networks

Rockwell
Automation
Global Manufacturing Solutions



Industrial Network Services



Data from the factory floor is vital to making informed business decisions, improving productivity, and increasing return on technology investments.

But many companies don't have the resources or expertise to develop and maintain a fully integrated communications network with the speed, volume and other functional capabilities required of today's more sophisticated and complex manufacturing environments.

That's why more and more companies are utilizing Rockwell Automation's Industrial Network Services to help design, validate and troubleshoot their manufacturing networks and integrate them with business/IT systems. Whether you have Ethernet ControlNet, DeviceNet, or another control network technology, our comprehensive suite of services can optimize its performance and reliability to ensure your production data is delivered when and where it's needed—while reducing project, start-up and maintenance costs.

Services. Rockwell Automation offers a suite of packaged and custom Industrial Network Services for Design, Validation, Performance Evaluation and Troubleshooting. Packaged services include a pre-defined set of tasks performed (see chart to right).

Good network design is the foundation upon which performance and reliability are built. Without it, your network may never meet the functional requirements needed to achieve production and business goals.

Installation and media problems cause most unplanned downtime events in operating networks. Was your network installed to design specifications? Were specified components used? Were proper installation techniques followed?

Is your network overloaded? Can it be expanded? Should it be migrated to a different or newer networking technology? Not knowing the answers to these questions could result in expensive investments in wrong or unnecessary equipment.

Industrial networks are the backbone of many manufacturing processes. When a significant network slowdown or unplanned downtime event occurs, it can cripple production and seriously impact your bottom line.

Network Design

Turnkey Design and Re-engineering Services

Rockwell Automation can provide complete turnkey network design for new networks or re-engineering services to improve the performance and reliability of existing systems. The design process includes an assessment of your business objectives and creation/identification of functional requirements. We then deliver a detailed, customized specification for the system that best meets those needs. All design specifications include the following basic elements:

- Network topology (including considerations for integration with information/business systems)
- Performance analysis
- Recommended hardware, configurations and media
- Implementation timeline and cost
- Complete documentation

Design Review

If you have an existing design, or if you require a Design Qualification (DQ) of either your design or one from a supplier, Rockwell Automation's experienced network engineers can review it to ensure the architecture and specified components will meet your functional requirements. Services include review of the following elements,

- Network drawings (cables, connectors, repeaters, nodes, etc.)
- Hardware specifications (switches, hubs, repeaters, routers, firewalls, etc.)
- Software specifications and configurations
- Network performance calculations
- Complete documentation with analysis and design recommendations
- Network validation database

Network Validation

To confirm networks are installed correctly, Industrial Network Services uses state-of-the-art network diagnostic tools to conduct preactive and active tests (see chart to right) to validate system installation and ensure performance is within standards outlined by TIA/EIA, ODVA and CNI. All test results and performance data are completely documented as a baseline for future reference.

Preactive Testing - Network Installation Qualification (IQ)

Tests system performance without devices connected and activated to verify installation of new networks and prevent commissioning problems. The following network attributes are verified through Preactive tests:

- Network topology
- Routing/cable length
- Component specification
- Terminators/resistance
- Operating environment
- Wiring and grounding

Active Testing - Network Operation/Process Qualification (OQ/PQ)

Tests system performance with all devices connected and activated to ensure reliable communications and verify critical operating parameters. The following network attributes are verified through active tests:

- Signal quality
- Propagation delay
- Common mode voltage (DNET)

Installation Management

As a custom service, Rockwell Automation can supervise and document the physical installation of new networks.

Network Performance Evaluation

A network performance evaluation can provide the information you need to make informed technical, business and financial decisions regarding upgrades, modifications, and expansions. Our evaluation services include comprehensive design analysis, tests, and measurements to determine if the operation of an existing system is consistent with your current functional requirements and if it has the bandwidth and architecture to handle additional requirements or equipment. The resulting data also provides a baseline of the current operating and physical status of your network, which future maintenance checks can be measured against to ensure optimal performance.

Network Troubleshooting/Repair

Industrial Network Services offers complete on-site service to troubleshoot known network problems quickly. Utilizing many of the same diagnostic tools used for validation, our network engineers can often identify the source of trouble while the system is operating, and can execute corrective action to prevent or minimize downtime.



Packaged Services – Tasks Performed

	Parameter	Design Review	Validation	Evaluation	Troubleshooting	Task Description
Review/Check/Calculate	Installation Plot	■		■		Review network drawings including components, part numbers, lengths, groundings, etc.
	Component, Media Selection	■				Review the network Bill of Materials
	Node/Tap Count	■		■		Review overall network/segment node count
	Communication Rate	■				Check specified communication rate
	Segment/Network/Trunk/Drop Lengths	■				Check all network/segment lengths
	Resistance	■				Calculate the terminating resistance
	Utilization	■		■		Calculate network utilization/bandwidth
	Current/Voltage	■		■		Calculate common mode voltage, overall network current usage, drop line current usage
	Power Supply	■				Check power supply placement, size, and amount
	Transient Protection	■				Check for proper transient protection
	Propagation Delay	■				Calculate propagation delay based on media specifications
	Repeater Configuration	■				Check for proper repeater configuration
Fiber Cable	■				Calculate fiber propagation delay and attenuation	
Measure/Identify/Inspect	Component, Media Selection		■	■	If Required	Confirm installed components
	Node/Tap Count		■	■	If Required	Count network/segment nodes
	Network/Segmentation Identification		■		If Required	Visually identify all devices, cables, networks, etc.
	Segment/Network/Trunk/Drop Lengths		■		If Required	Measure all network/segment to ensure installed length does not exceed specifications
	Resistance		■		If Required	Measure resistance to ground and terminating resistance to identify missing, extra, and/or improper termination
	Utilization		■	■	If Required	Measure network utilization to determine loading
	Cable and Connectors		■		If Required	Inspect components, routing, installation, operating environment, etc. to ensure compliance with specifications
	Grounding		■		If Required	Measure for proper network grounding (DNET) and ground isolation (CNET, DH+)
	Communication Rate		■	■	If Required	Measure actual communication rate
	Cable Verification		■		If Required	Measure crosstalks and other cable problems
	Fiber Cable		■		If Required	Measure fiber cable propagation delay and attenuation
	Errors		■	■	If Required	Identify network errors and their source
	Common Mode Voltage				If Required	Measure common mode voltage
	Transient Protection		■	■	If Required	Measure transient protection (when necessary)
	Repeater Configuration		■	■	If Required	Check layout of a network using repeaters
	Propagation Delay		■		If Required	Measure signal speed, timing
	Signal Quality		■	■	If Required	Measure reflection, distortion, amplitude, transitions, lead/trail edge slew rate, and waveshape envelope to ensure compliance with specifications
	Power Supply		■	■	If Required	Measure power at the power supply and ends of network
	CAN H/L		■	■	If Required	Measure CAN H/L to ensure compliance with specifications
	System Response			■		Measure maximum response of network while operating
Bandwidth/Loading			■		Measure impact on performance	
Scheduled Connections Per NUT			■		CNet-specific performance parameter (estimated)	
Doc.	Analysis, Test Data & Recommendations	■	■	■		Provide baseline data and information for future maintenance checks and system enhancements/expansions.

How To Order

Industrial Network Services can be ordered by catalog number for small projects (up to 10 networks) that require packaged services. Catalog numbers are shown below. For projects involving more than 10 networks, please contact your local Rockwell Automation sales office or a authorized distributor for custom order information. All Network Services include a complete summary report documenting tasks/analysis performed and recommendations for improvement.

Service	Applicable Networks	Catalog Number
Design Review Review/analysis of network drawings/components and calculations of network performance to ensure system is properly designed to meet functional requirements. Also includes development of a network validation database.	DNET, CNET, ENET MCC External DeviceNet	9300-NSD1* 9300-NSMCD1
Network Validation Proactive and active network tests to confirm system has been installed correctly and performance is within TIA/EIA, ODVA and CNI standards.	DNET, CNET, ENET, DH+ MCC External DeviceNet	9300-NSV10* (1-10 Nodes) 9300-NSV20* (11-20 Nodes) 9300-NSV30* (21-30 Nodes) 9300-NSMCD1
Network Performance Evaluation Design analysis, tests and measurements to baseline current network performance and physical status.	DNET, CNET, ENET, DH+	9300-NSEVAL1*
Network Troubleshooting & Repair (1 scheduled day) Eight hour block of time during regular business hours to diagnosis and repair a known network problem(s). Separate charge for repair parts.	DNET, CNET, ENET, DH+	9300-NST1

* To order services for redundant systems, add -R to the end of the catalog number shown (e.g. 9300-NSD1-R)

For More Information: For more information on Rockwell Automation Industrial Network Services, contact your local Rockwell Automation sales office or authorized distributor, or go to <http://support.rockwellautomation.com/supportprograms>.

Industrial Network Training: Rockwell Automation Global Manufacturing Solutions offer a variety of standard and custom classroom training to help your plant personnel operate and maintain control networks. Instruction can be provided on the following topics: ControlNet, DeviceNet, EtherNet/IP, fundamentals, media installation, performance calculations and the use of test equipment. For additional information and course schedules, go to www.rockwellautomation.com/training.

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