



NOKIA

A roadmap for SCADA transformation

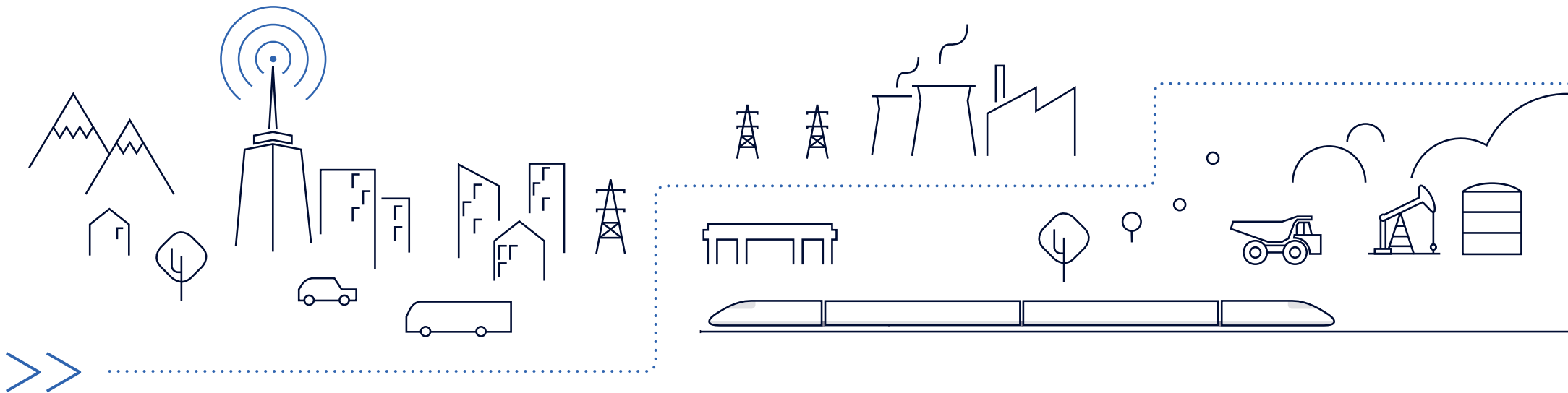
How to take your SCADA system to
IP/MPLS without operational impact.

You can migrate your network to IP/MPLS and keep your SCADA system, too.

SCADA systems are vital to the critical infrastructures operated by utilities, transportation providers, and the oil, gas and mining industries. Yet because of their long lifespans, many of today's SCADA systems still depend on aging TDM-based communications services and equipment that have reached the brink of extinction.

While many infrastructure operators are migrating from TDM to next-generation IP-based communications offers enormous advantages, few organizations are willing to commit the resources needed to move their legacy SCADA systems to support IP communications overnight.

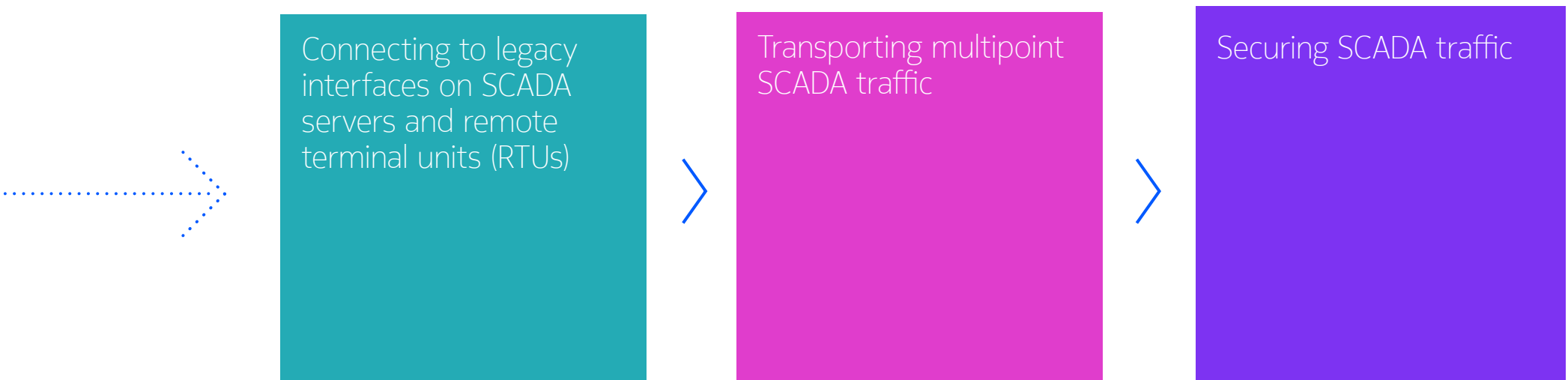
Fortunately, they don't have to.



The obstacles can be overcome.

Three main hurdles stand between today's TDM-bound SCADA systems and its support on a new IP/MPLS network.

With the right technology and migration approach, each of these barriers can be removed.



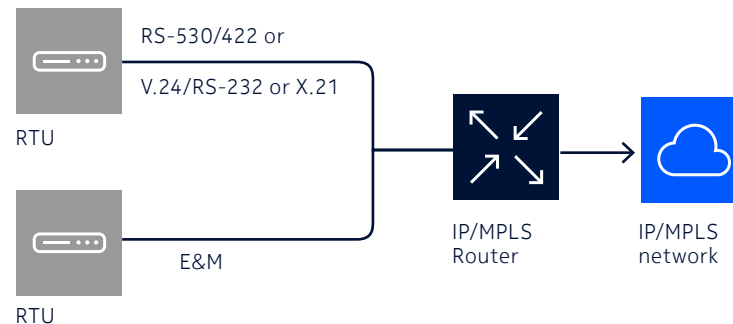
Connect your legacy SCADA interfaces.

IP/MPLS networks are fully capable of carrying TDM traffic. The challenge is to connect older SCADA systems, which typically use a low-speed V.24/RS-232 or X.21 serial interface or four-wire analog E&M interface, to the new network.

With Nokia, you can choose one of two ways to connect and terminate your communications on legacy interfaces on SCADA equipment based on your operational needs:

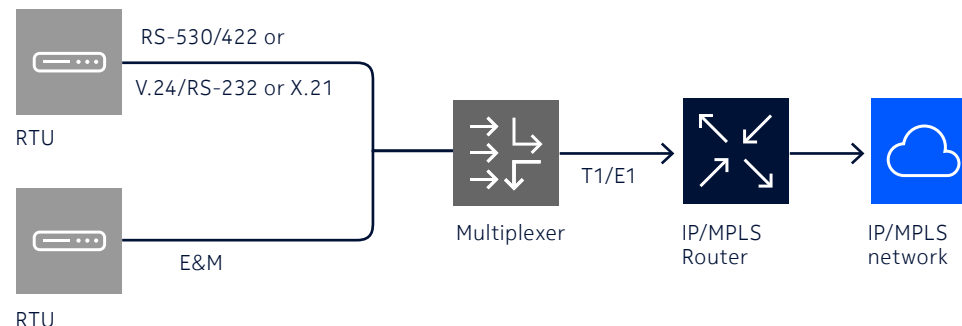
Direct connection

Here, the IP/MPLS router connects directly to the SCADA equipment — a simple solution enabling a truly end-to-end packet architecture with SCADA devices.



Connection via E1/T1 interface

The existing TDM multiplexer maps each SCADA circuit into a 64kbps channel inside an E1/T1 interface in front of the IP/MPLS router.



Transport your SCADA data.

SCADA systems rely on multipoint communications. In an IP/MPLS world, that means some kind of bridging solution is needed to broadcast the traffic flowing to and filter the traffic flowing in from your RTUs.

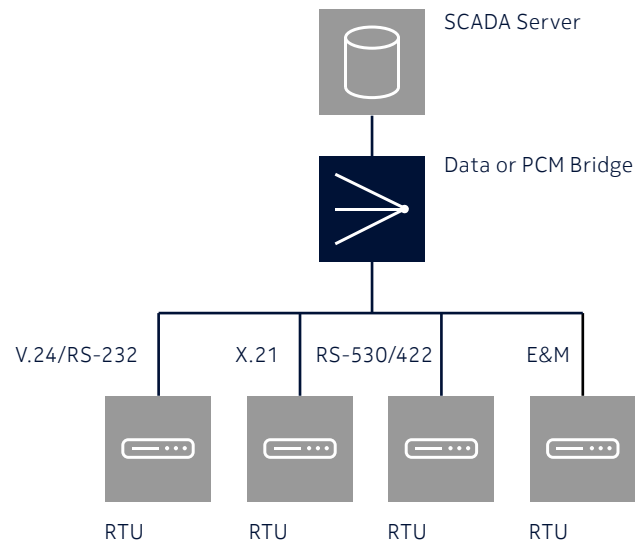
Nokia provides multiple options for bridging and transport to get your data moving the way you need it to:

Multidrop data bridging

Designed for SCADA systems with low-speed V.24/RS-232 and X.21 serial interfaces.

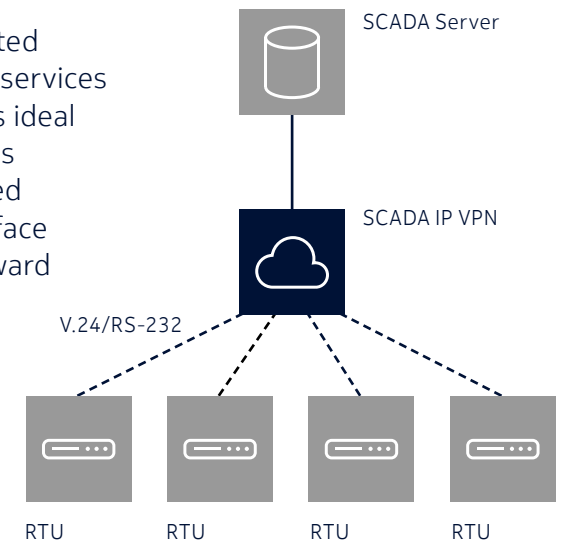
PCM multidrop bridging

Designed for SCADA systems with 4-wire analog E&M interfaces.



Raw socket

Serial data is transported using Layer 3 IP/MPLS services (such as IP VPN). This is ideal if the SCADA server has already been retrofitted with an Ethernet interface as part of the path toward a full IP upgrade.



Our multidrop bridging solutions support both types of SCADA communications architectures:

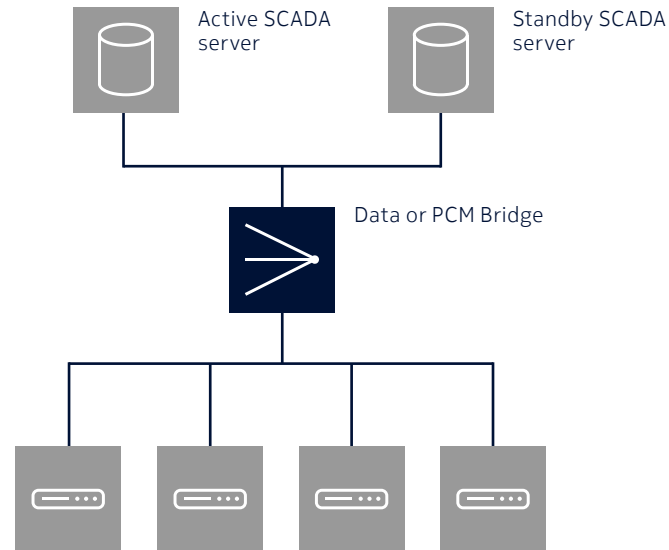
Centralized

The bridge is deployed only in the operations center router.

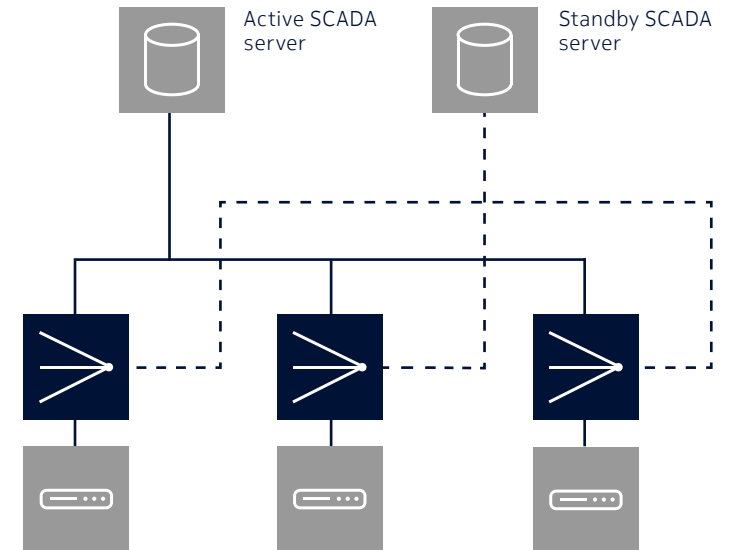
Distributed

Bridges are required at remote routers (to send messages to both the primary and standby servers).

Centralized SCADA communications architecture



Distributed SCADA communications architecture



Our 7705 Service Aggregation Router (SAR) family is unique in the industry, offering built-in multidrop bridging to enable seamless migration of legacy SCADA traffic to IP/MPLS networks.



7705 SAR-8



7705 SAR-H



7705 SAR-Hc



7705 SAR-Hm

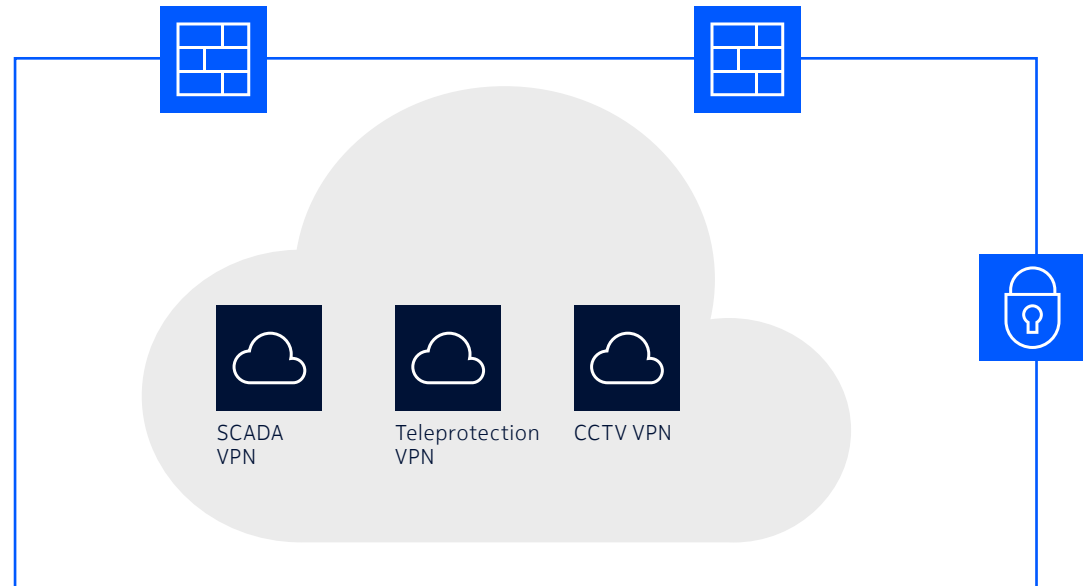


7705 SAR-Hmc

Secure your SCADA traffic.

An IP/MPLS network with label-switched path tunneling and segregated VPN services is already inherently secure. But as the frequency and complexity of cyberattacks continues to increase, addressing the challenge of security has never been more important.

Nokia has a range of network-based security measures that can be embedded seamlessly into your IP/MPLS network to offer the extra protection you need — including our unique **Network Group Encryption (NGE) solution** — to secure the transport of your SCADA traffic with no operational impact.



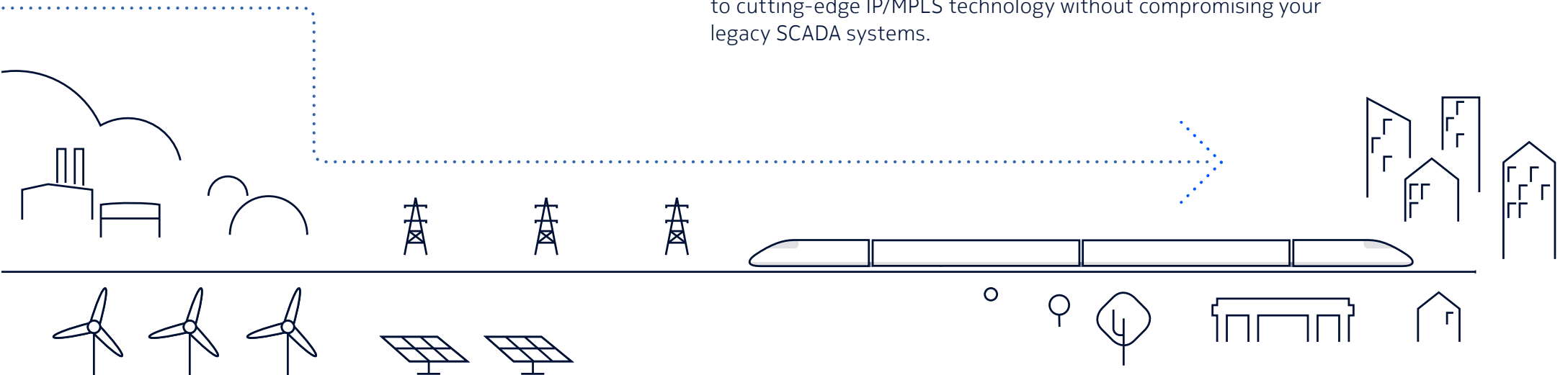
Reach your destination.

Once migration is complete, your IP/MPLS communications network can carry TDM-based SCADA traffic as well as IP-based SCADA data and other new bandwidth-intensive applications with no performance degradation.

The IP/MPLS network can then offer the following operational advantages:

- Flexibly introduce new applications and services
- Configure application-specific network service and quality of service parameters
- Handle all traffic types effectively, securely and reliably in real time
- Constantly monitor service performance
- Reduce the cost of operations.

Nokia's field-proven IP/MPLS solutions overcome the obstacles to SCADA migration with deterministic quality of service and strong resiliency, while reliably and securely carrying your mission-critical data. Our innovative product portfolio can uniquely help you upgrade to cutting-edge IP/MPLS technology without compromising your legacy SCADA systems.



Let us help with your network transformation.

For more technical details on Nokia SCADA migration solutions and IP/MPLS mission-critical network, download our white papers:

- **Transforming mission-critical networks: IP/MPLS network transformation to support legacy SCADA application migration**
- **MPLS for mission-critical networks**

Nokia is a global leader in the technologies that connect people and things. Talk to us about how we can help migrate your communications network to IP/MPLS while keeping your legacy SCADA systems.

For more information, visit networks.nokia.com/industries



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NOKIA

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering the future where networks meet cloud to realize the full potential of digital in every industry.

Through networks that sense, think and act, we work with our customers and partners to create the digital services and applications of the future.

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