



DIGITAL SUBSTATIONS

Automate your electricity distribution via utilizing wireless mobile networks

Webinar 2 June 2022

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Agenda


**Smarter, easier and more cost efficient –
Automate your electricity distribution via
utilizing wireless mobile networks**

Key challenges for operators managing
electricity distribution networks: cost-
efficient network management and ensuring
uninterrupted power supply

Introduction to the Arctic family of wireless
communication products

Questions and Answers (Q&A)

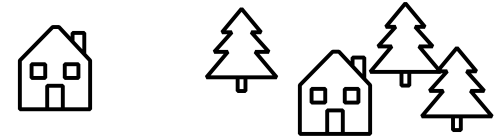




**Key challenges for operators
managing electricity distribution
networks: cost-efficient network
management and ensuring
uninterrupted power supply**

Arctic family of wireless communication products

Business environment and solutions



NUMBER of CONSUMERS

Urban and industrial areas

- High consumer density
- A lot of consumers
- Short distances

Suburban areas

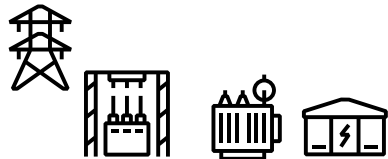
- Medium consumer density
- Fewer consumers
- Medium distances

SIZE of GEOGRAPHICAL AREA

Sparsely populated area

- Low consumer density
- Great geographical area
- Long distances

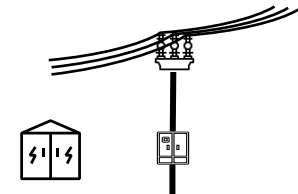
Substations and compact substations



Compact substations



Control cabinets



Arctic family

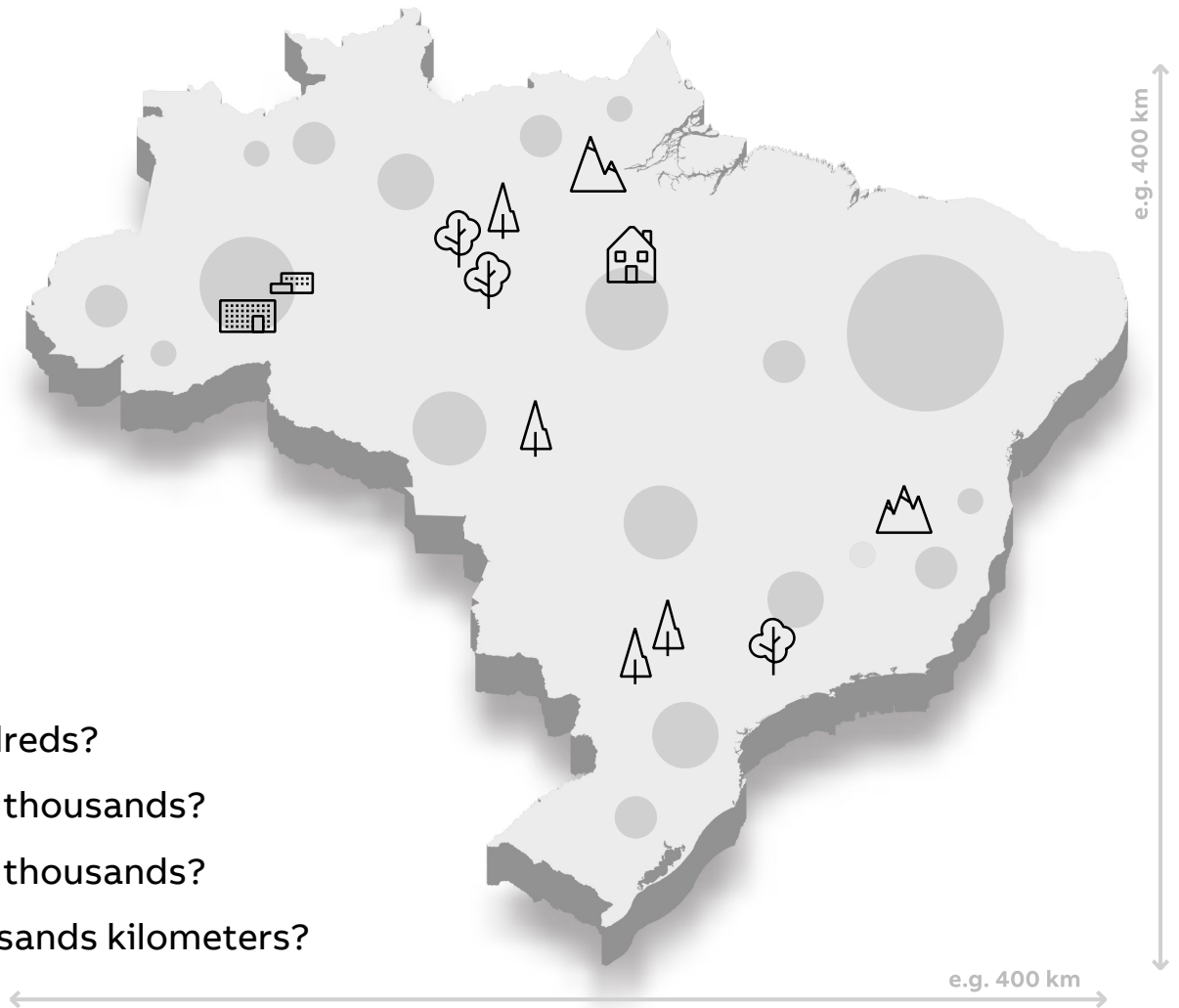
Business environment

Utility company's business environment

- Large geographical areas to serve
- Several environments: Urban, industrial, suburban, countryside
- Different customer densities per area

Utility company's assets, e.g.

- | | |
|---|---------------------------------|
| - Control rooms (SCADA) | > few to tens? |
| - Substations | > tens to hundreds? |
| - Compact substations | > hundreds to thousands? |
| - Control cabinets | > hundreds to thousands? |
| - Distribution lines: cables and overhead lines | > tens of thousands kilometers? |



The key for distribution network automation is **communication**

Arctic family

Traditional cable communication

Utility company's challenges with communication infrastructure

- Due to modernization, fixed communication media, like copper and fiberoptic cables, may not be available through medium-voltage lines.
- In urban areas, there are usually several operators who offer fixed line communication. The utility may have their own communication network as well.
- Sparsely populated areas may not have fixed communication media available near by or even at all.



Challenges faced with communication infrastructure

Arctic family

Mobile communication

Mobile network operators offer wide communication coverage

- Where there's electricity - you will find people
- Where there's people - there are mobile networks
- Mobile networks do not cover residential and working areas only, but also highways, roads and railways, where people are moving from one place to the next.
- From the utility company's point of view this means that there used to be mobile network available wherever they were operating.



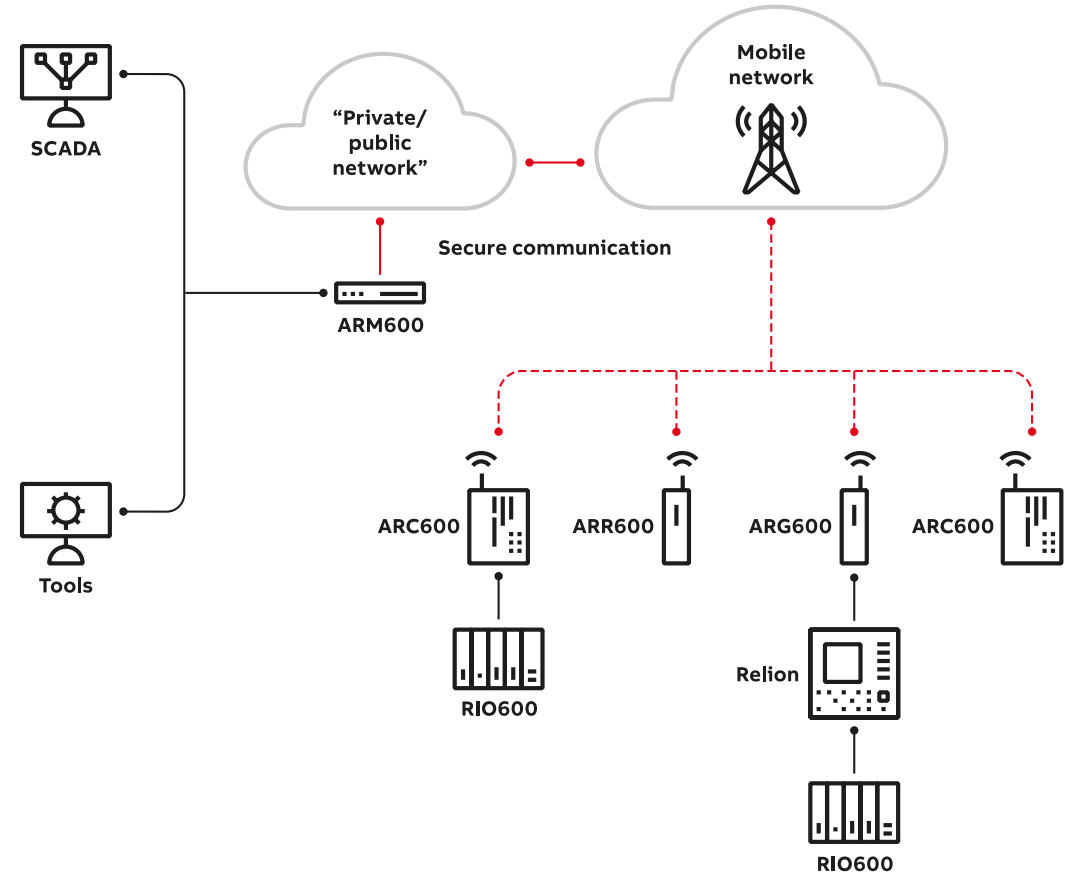
ABB has a solution to utilize mobile networks for distribution and grid automation

Arctic family

ABB's solution

ARM600 M2M gateways offer **secure communication** between the control room and Arctic gateways and controllers.

- It is possible to utilize public or private APNs (Access Point Name) in mobile networks.
- There are several features available to monitor and manage your devices remotely.
- Arctic gateways and controllers enable mobile connectivity for substations, secondary substations and control cabinets.



The background image shows a scenic landscape. In the foreground, there is a field of bright yellow wildflowers. A dark, winding path or road cuts through the field. Beyond the path, the terrain rises into a green grassy hill. Several tall, wooden utility poles with cross-arms and insulators are spaced out across the hill, with power lines stretching across the sky. The sky is a clear blue with some light, wispy clouds. On the left side of the image, there is a large, white, abstract, curved shape that partially obscures the landscape.

Introduction to the Arctic family of wireless communication products

Arctic family of wireless communication products

Secure wireless communication over mobile 2G/3G/LTE networks



ARM600/ARM600SW

Central communication server
VPN concentrator
Firewall and routing
Arctic Patrol for device fleet management
Static IP addressing



ARG600

Protocol converter
TCP/IP router
Serial over TCP/IP
VPN and firewall
Single and dual SIM variants



ARC600

Control and indication of three switching devices
Protocol converter
Battery management and monitoring
TCP/IP router
VPN and firewall



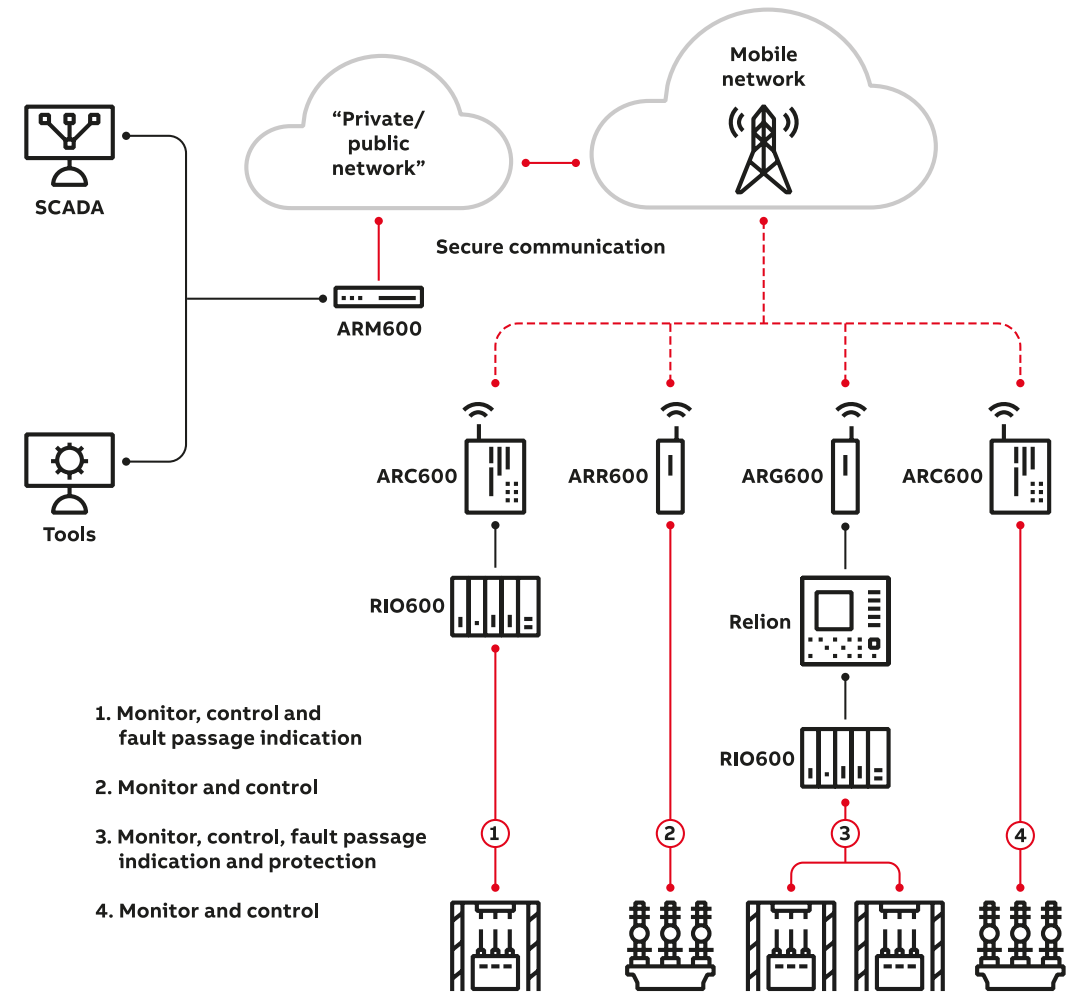
ARR600

Integrated I/O
Protocol converter
TCP/IP router
Serial over TCP/IP
VPN and firewall

Arctic system

Use cases

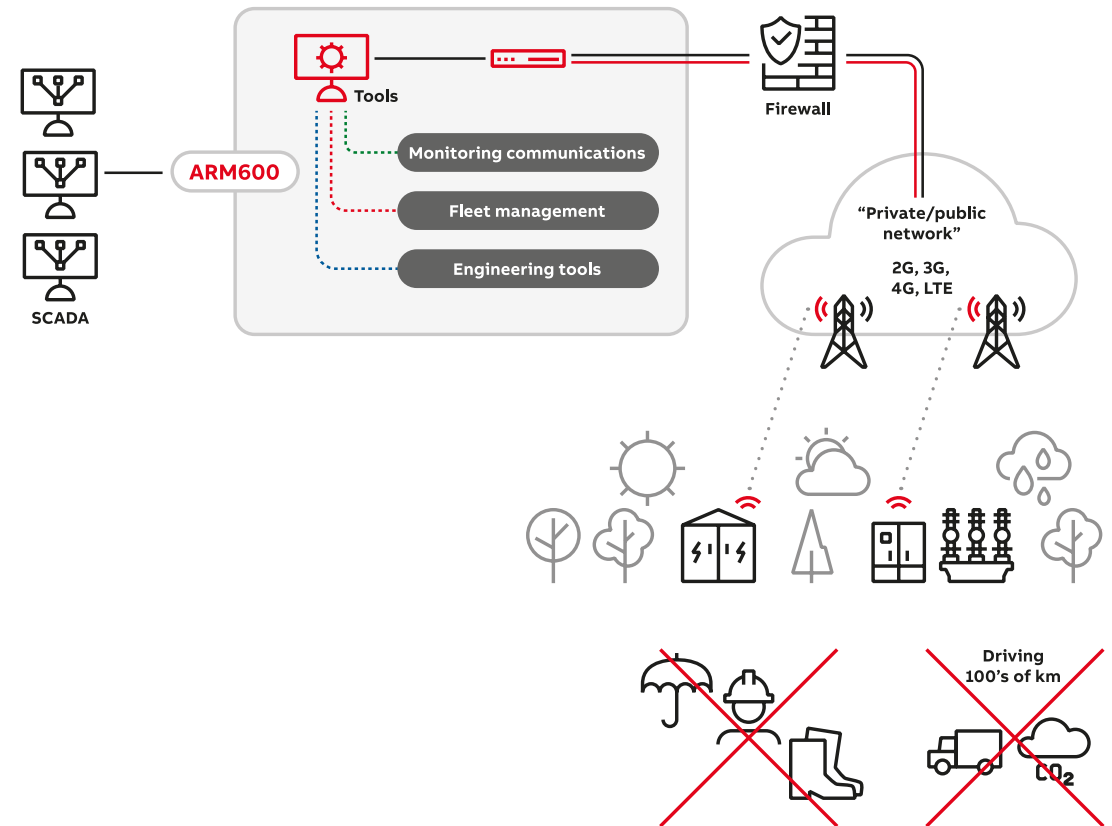
- Position indication of the breaker and switches
- Control of the breaker and switches
- Monitoring and controlling the Ring Main Unit (RMU)
- Measurements from the protection relays
- Fault passage indication (FPI)
- Distribution transformer temperature and load
- Status of the Arctic devices



Arctic family

Benefits

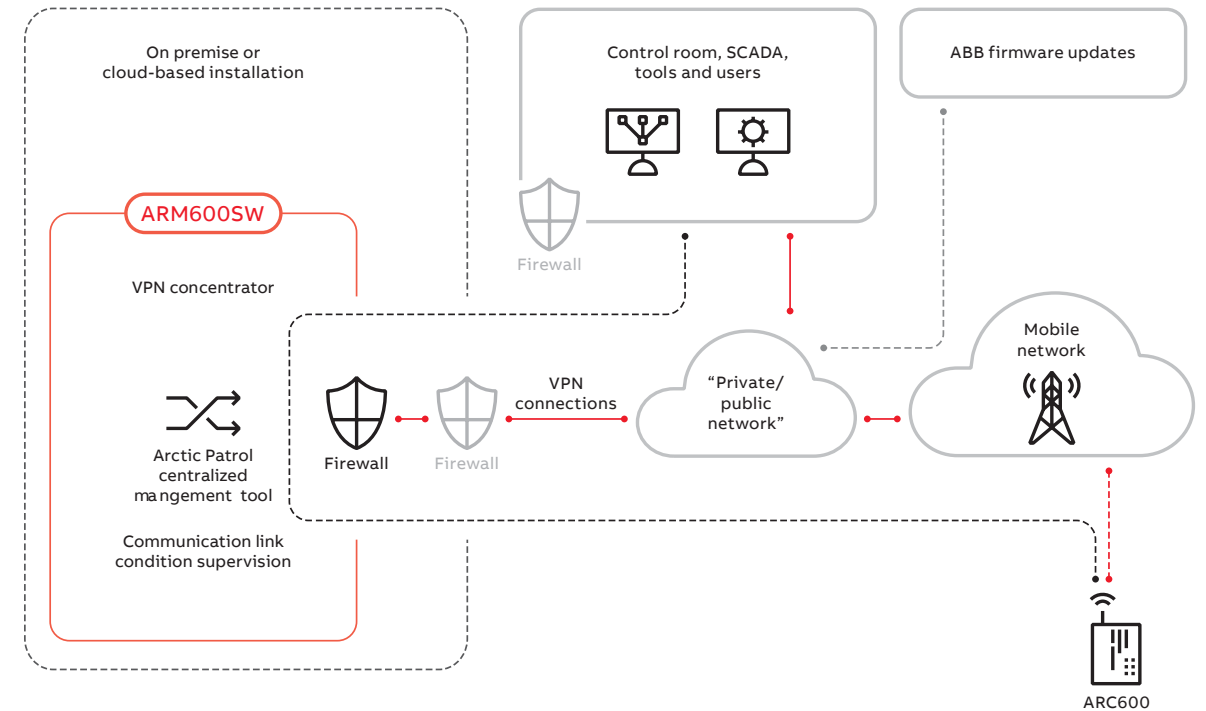
- Fast installation thanks to being able to utilize the communication available via the mobile network.
- Increasing intelligence to all the distribution controlling points of the network, makes the grid smarter and offers the possibility to minimize the outage area due to faults in the network.
- **More data available** to support decision-making for both the system automation and the control room personnel.
- Can reduce outages and outage duration with fast fault isolation and power restoration – SAIFI, SAIDI
- Remote software update, setup changes, and engineering of the devices in the field.
- Minimizes the need to do on-site field service, which brings time, cost and CO₂ emission savings.



ARM600 and ARM600SW M2M gateways

Benefits

- **Secure communication** between the control room and the devices on the field over private or public mobile networks
- **Condition monitoring** of the mobile network's connection status and quality
- **Remote updates** of the field devices
- Centralized Arctic device configuration profile storage for easy backup and maintenance
- Built-in tools for troubleshooting
- End-to-end routing even with standard SIM cards
- Mobile network operator independent
- Fully integrated solution

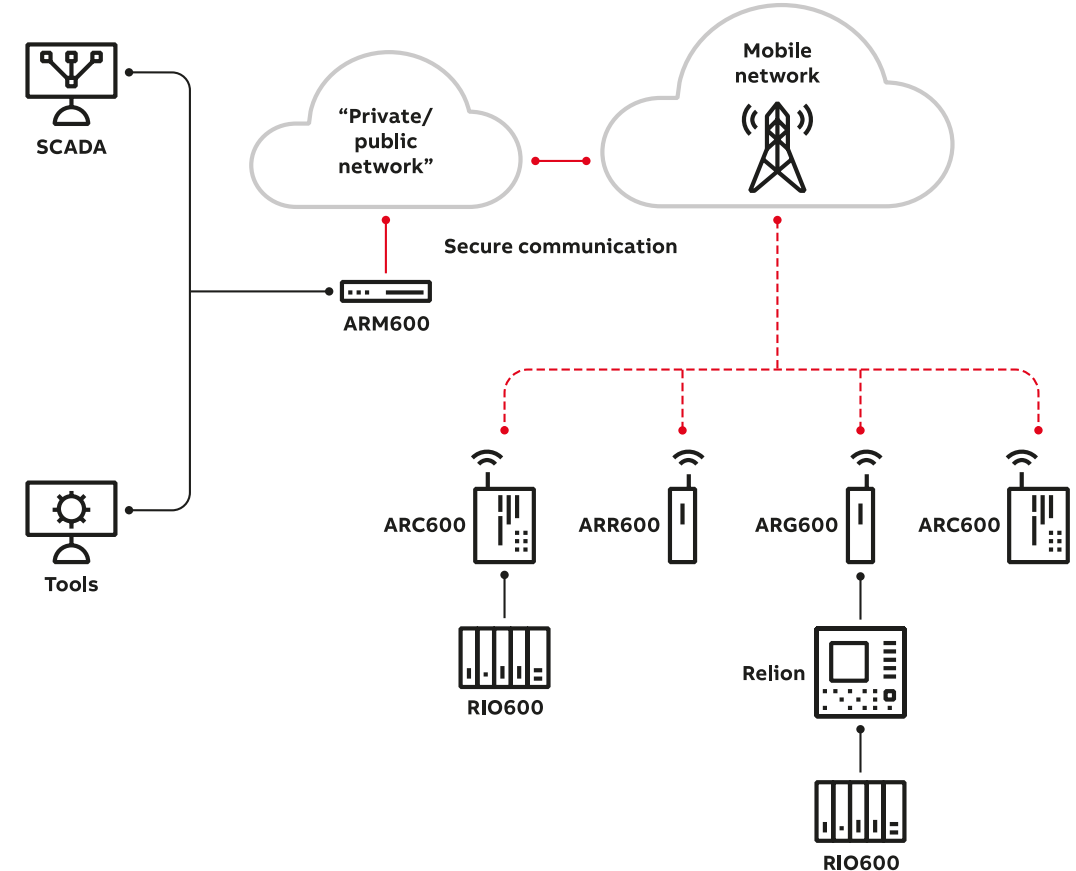


ARM600 gateway is also available as a software-only product, ARM600SW

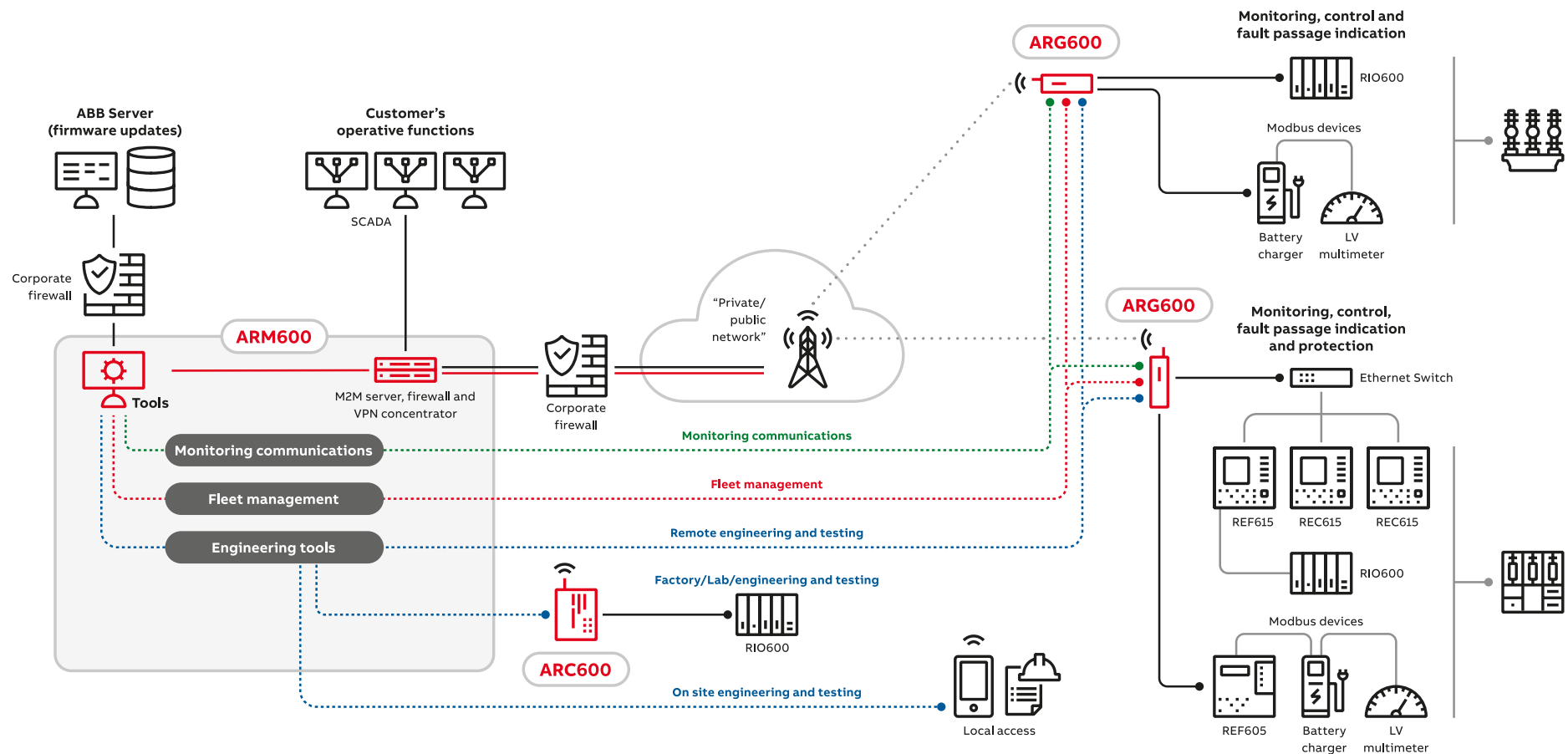
ARM600 and ARM600SW M2M gateways

Main features

- VPN concentrator: manages VPN tunnels to Arctic 600 series wireless gateways
- Users can connect to the ARM600 with a PC from any location via the VPNC
- Configuration via web UI and console (SSH) access
- Supports OpenVPN, proprietary L2TP and proprietary SSH-VPN
- Supports OpenVPN bridging
- Provides static IP addressing of Arctic 600 series wireless gateways for SCADA or any other system
- Full routing capability – allows integrating remote Local Area Networks into a central Local Area Network
- Configurable firewall to restrict unauthorized access
- Supervises the mobile connections to the connected Arctic wireless gateways



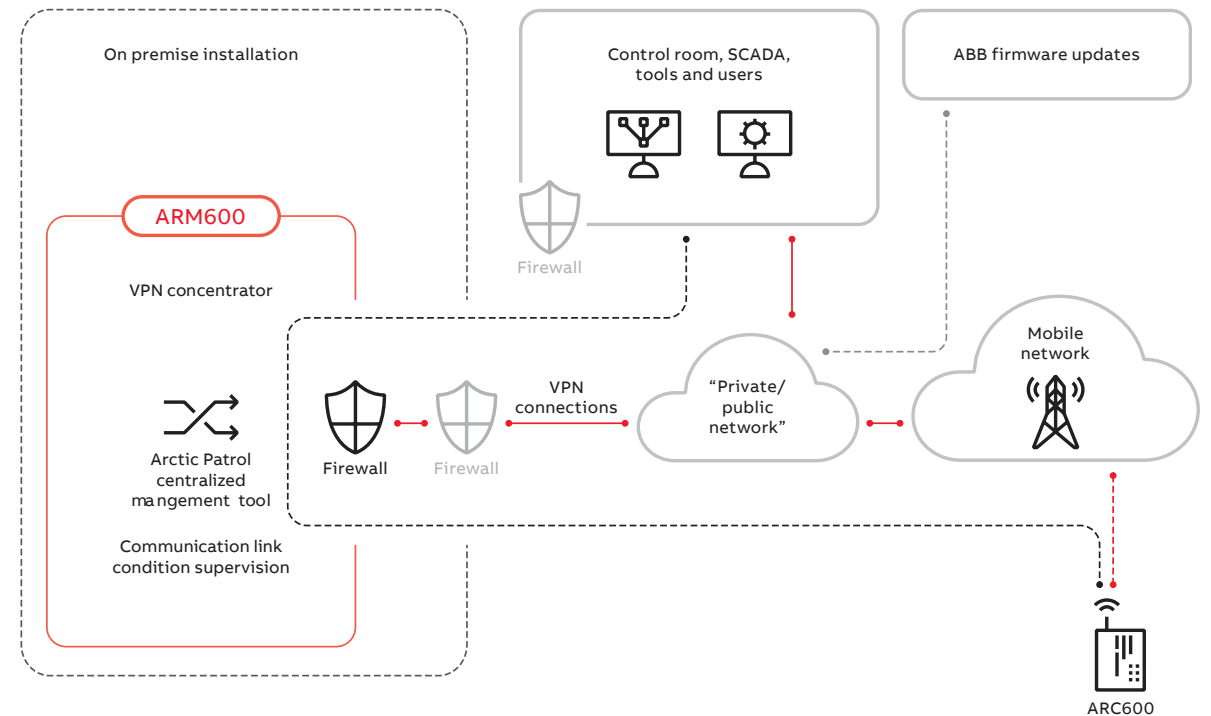
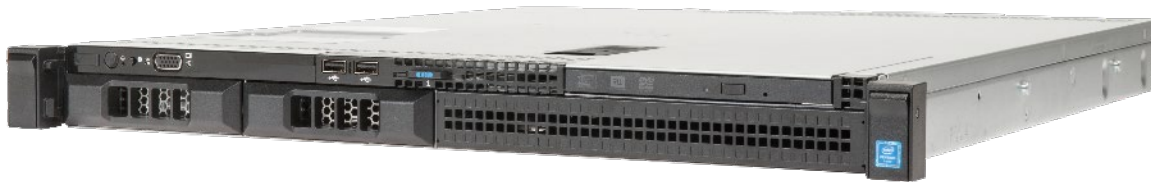
Arctic system



ARM600 M2M gateway

With server hardware

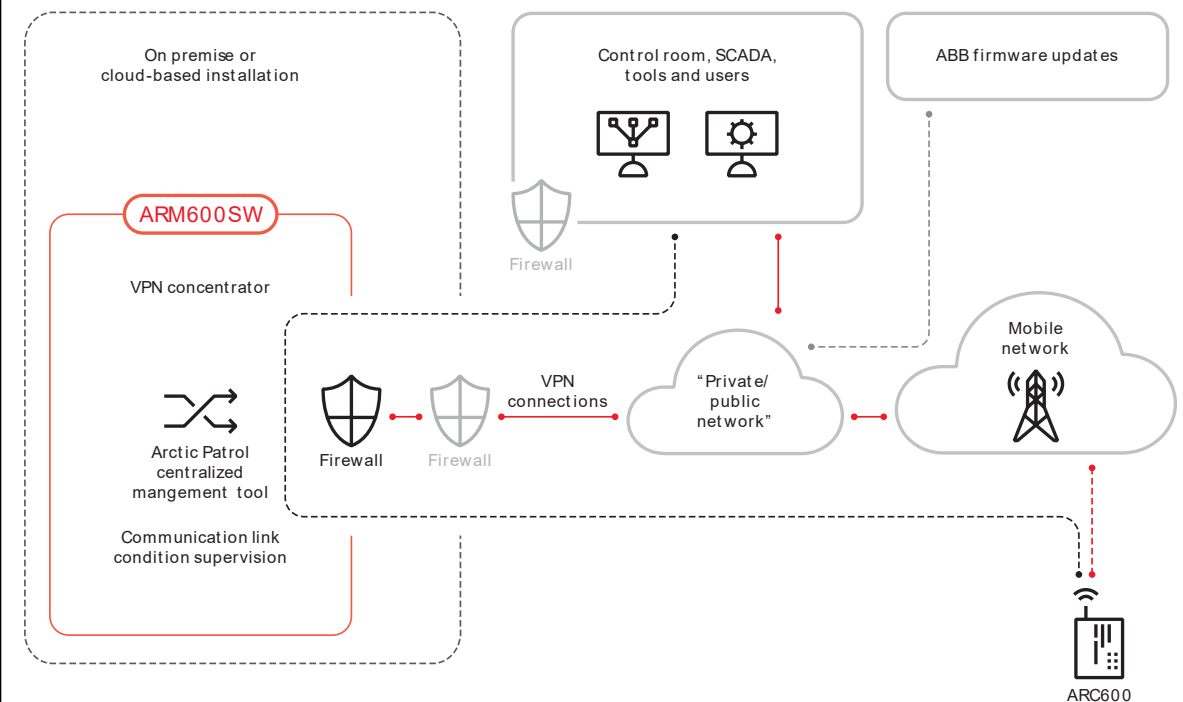
- ARM600 M2M gateway is the VPN concentrator between all remote Arctic 600 series gateways and the central control and monitoring application
- ARM600 is typically installed in the Network Control Center (NCC) where it can be directly connected to the SCADA
- Automated notifications of software update availability for Arctic devices and ARM600 provides a faster update cycle for increased cyber security
- **Two variants available** depending on system size and redundancy requirements



ARM600SW M2M Gateway

Software

- ARM600SW is a Linux-based software delivery only. Supports virtual machine environment, for example, VMware vSphere ESXi 6.7 or later.
- Installation can be on-premise or cloud-based.
- Official support for use in **a virtual machine environment** provides increased cyber security and reliability including easy system backup and restoration.
- Two license variants available for different system sizes
- Automated notifications of software update availability for Arctic devices and ARM600SW provides a faster update cycle for increased cyber security for a period of 3 years, which can be renewed with 3-year intervals.
- The license is upgradeable to a bigger system.



ARM600 M2M Gateway

Selection table

	ARM600B2500NA	ARM600B2505NA
Max. Arctic connections	300	2000
Power supply	Single	Dual
HDD	Single	Dual
Size	1U 19"	1U 19"
Depth	495 mm	607 mm

	ARM600SWE2A3	ARM600SWE3A3
Max. Arctic connections	200	2000
vCPUs*	2 or more	8 or more
RAM*	8GB or more	32GB or more
HDD*	32GB or more	32GB or more

* Minimum system requirements for ARM600SW



More information

More information

Available on our web pages

Arctic family webpage

<https://new.abb.com/medium-voltage/digital-substations/communication-devices/arctic-family>

Downloads section

- Brochures and presentations
- Technical documentation (user manuals)

Webinar recordings

- Arctic gateways, controllers and field applications
[Introduction to Arctic family, webinar June 2020](#)
- This presentation as seminar format
[Smarter, easier and more cost-efficient, utilizing wireless networks, webinar](#)

ABB HOME > OFFERINGS > MEDIUM VOLTAGE PRODUCTS > DIGITAL SUBSTATIONS > COMMUNICATION DEVICES > ARCTIC FAMILY

Arctic family of wireless communication products

The Arctic product family offers the widest range of products and solutions for wireless communication in industrial and utility applications. The user is able to build reliable and cost-effective communication systems that are application independent.

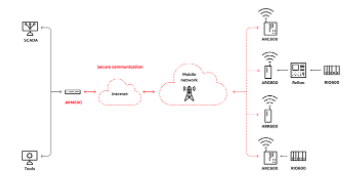
Wireless communication solutions utilizing public cellular networks offer users a cost-effective and secure platform for substation automation, condition monitoring, remote maintenance and easy access to remote locations. The solution is fully application independent, meaning that any type of remote application can be connected to any central application. For utilities, these remote applications can be e.g. pole-top equipment or ring main units. The central application in turn is typically a supervisory, control and data acquisition system (SCADA). In addition, special applications can be built to comply with user requirements.

Complete communication solution

A complete communication system consists of Arctic gateways and a central ARM600 M2M Gateway. A completed system offers secure VPN tunnels from the central location to the remote Arctic 600 series gateways.

ARM600 includes condition monitoring to supervise the connections and it informs the user of any disruptions. Also statistical information e.g. the network usage, speed and uptime are included. ARM600 offers remote management including e.g. remote Arctic gateway firmware mass updates and automatic backups of Arctic gateway configurations.

With the solution's routing capabilities, it is possible to connect entire Local Area Networks (LAN) together. For example, a network in a remote substation can be connected to the company internal network.




Are you looking for support or purchase information?
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ABB

SUCCESS STORY

ABB's grid automation improves reliability in Elenia's network

Elenia, Finland



Smart compact secondary substations, the best fault location in the market, and Arctic communication technology give Elenia's distribution network its reliability and flexibility.

Project at a glance

Customer: Elenia Oy, the second-largest electricity distribution system operator in Finland
Segment: Utility
ABB Products: Compact Secondary Substation CSS (Dipstick), Ring Main Unit RMU (SelfReling), Wireless Controller (ARC600), Advanced Fault Indicator (AFI600)

Fault indications come from ABB's award-winning multi-frequency admittance calculation method, which can reliably identify every type of fault. ABB and Elenia have worked together to develop this method. The fault indication method, which is far more reliable than competing methods, was tested in real circumstances in Elenia's grid.


Customer challenge

To improve the security of supply of their distribution network, Elenia began extensive grid automation and cabling work back in 2006. The maximum

Remote use of the network is based on ABB's Arctic technology. The communication system has strong cybersecurity and makes use of public mobile networks, and it has proved its reliability in more than one storm. Real-time, automatically gathered data superior to in time.


Wireless Controller ARC600

User Manual



M2M Gateway ARM600

Product Guide



ABB