Simplify your TDM-to-IP evolution with Nokia

A guide for U.S. Department of Defense organizations

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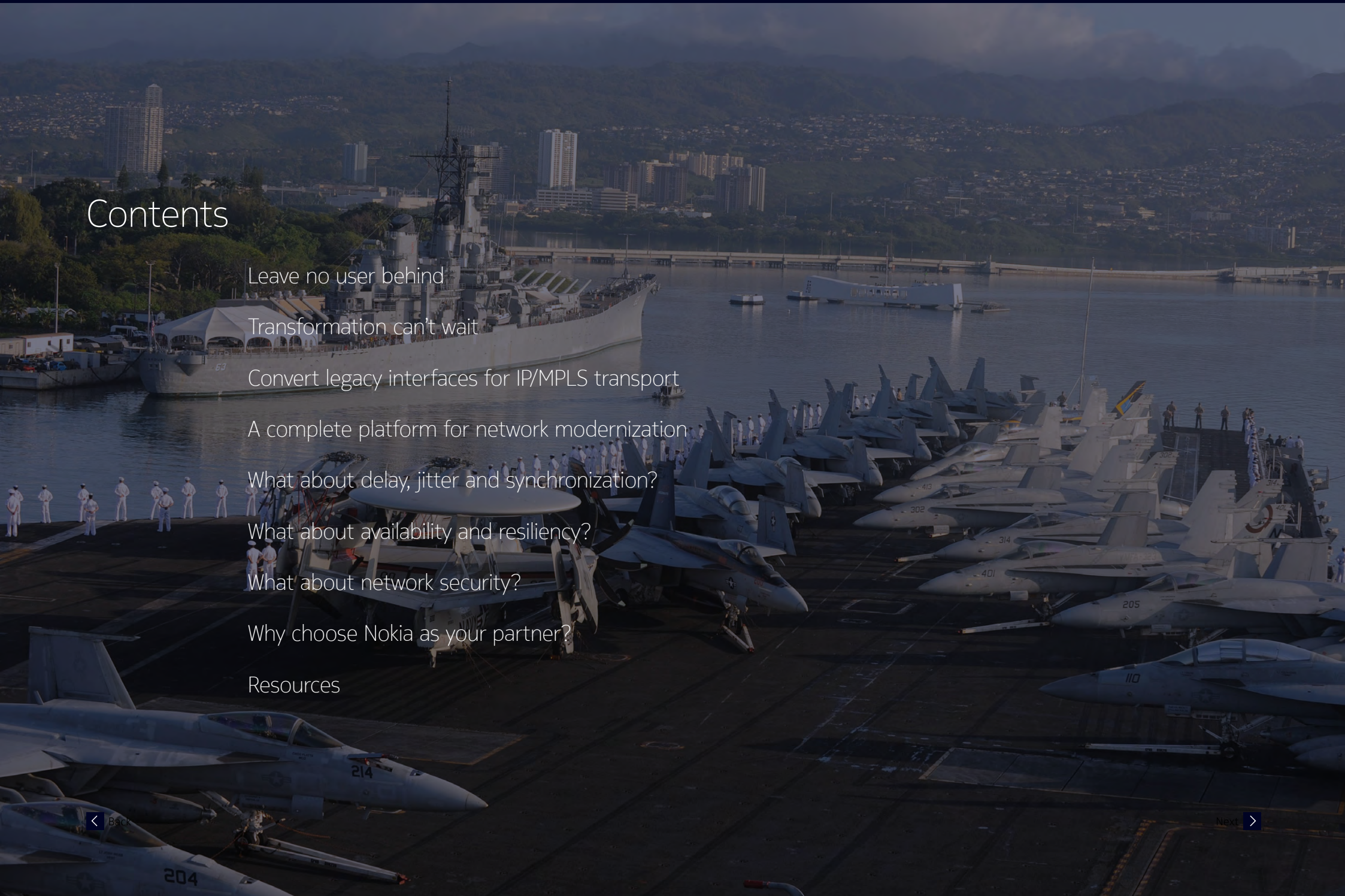

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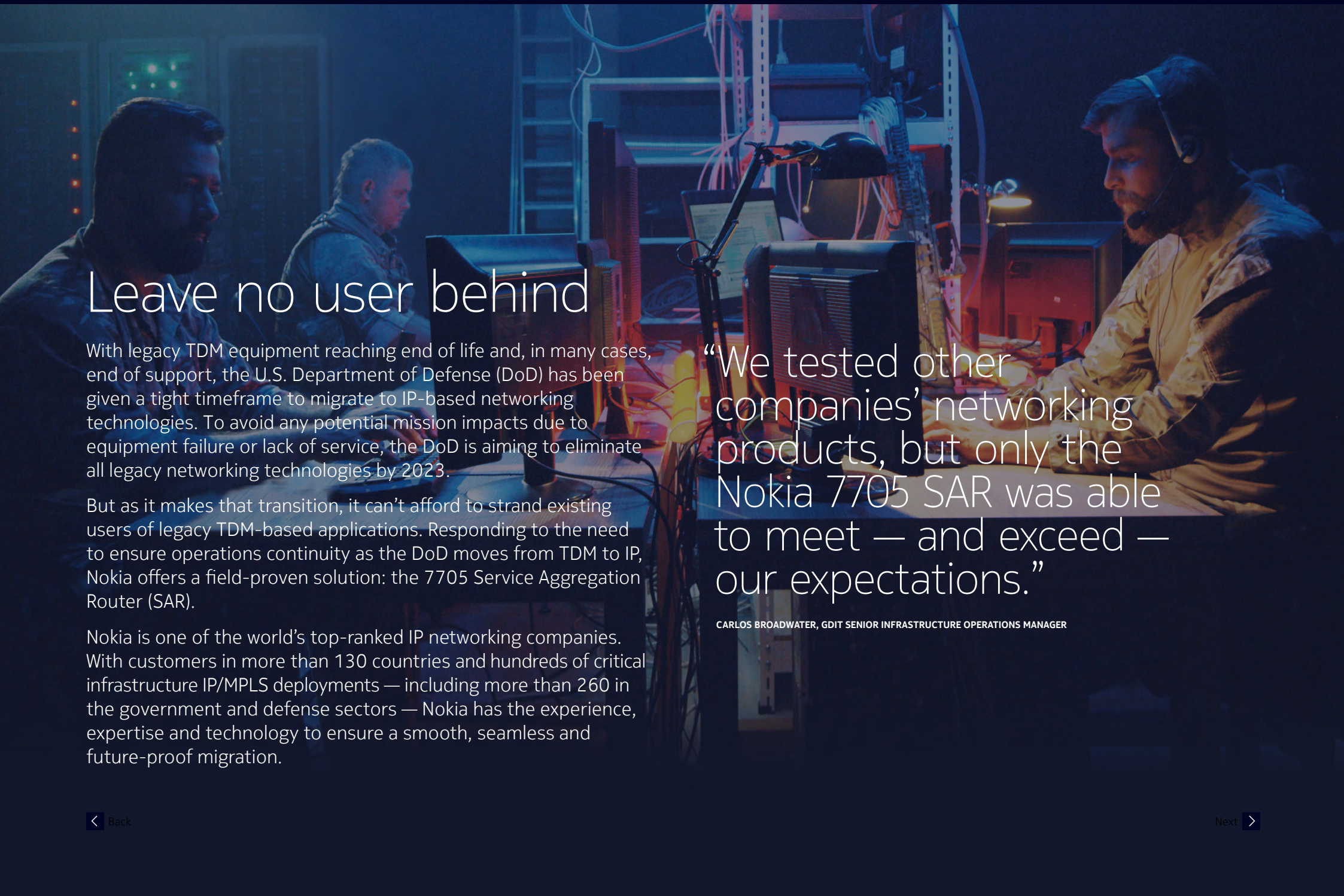


Leave no user behind

With legacy TDM equipment reaching end of life and, in many cases, end of support, the U.S. Department of Defense (DoD) has been given a tight timeframe to migrate to IP-based networking technologies. To avoid any potential mission impacts due to equipment failure or lack of service, the DoD is aiming to eliminate all legacy networking technologies by 2023.

But as it makes that transition, it can't afford to strand existing users of legacy TDM-based applications. Responding to the need to ensure operations continuity as the DoD moves from TDM to IP, Nokia offers a field-proven solution: the 7705 Service Aggregation Router (SAR).

Nokia is one of the world's top-ranked IP networking companies. With customers in more than 130 countries and hundreds of critical infrastructure IP/MPLS deployments — including more than 260 in the government and defense sectors — Nokia has the experience, expertise and technology to ensure a smooth, seamless and future-proof migration.

"We tested other companies' networking products, but only the Nokia 7705 SAR was able to meet — and exceed — our expectations."

CARLOS BROADWATER, GDIT SENIOR INFRASTRUCTURE OPERATIONS MANAGER

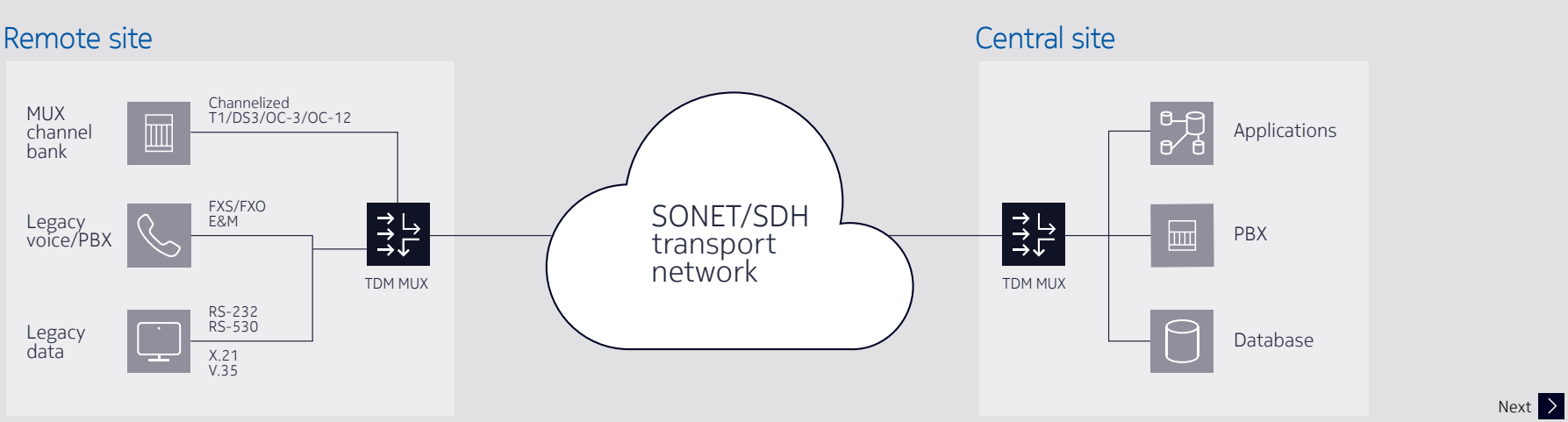
Transformation can't wait

For years, TDM and SONET/SDH networks have delivered resilient, reliable and secure voice, video and telemetry data services for mission-critical applications. Yet today, portions of the Defense Information Systems Network infrastructure are past end-of-life, with many vendors ending maintenance and technical support for TDM products.

On top of that, internal providers like the Defense Information Systems Agency as well as external providers like AT&T and Verizon are no longer accepting new TDM circuit requests. These providers also plan to discontinue existing circuits in favor of Ethernet.

While all of this creates an urgent need for network transformation, many federal agencies, including the DoD, still rely on legacy TDM services and applications — and will for years to come, largely because it is impractical to replace everything at once. Agencies need a way to start their transition to IP networking while keeping older applications up and running just a little longer. That's what the Nokia 7705 Service Aggregation Router (SAR) enables.

Figure 1. Current state of DoD network infrastructure



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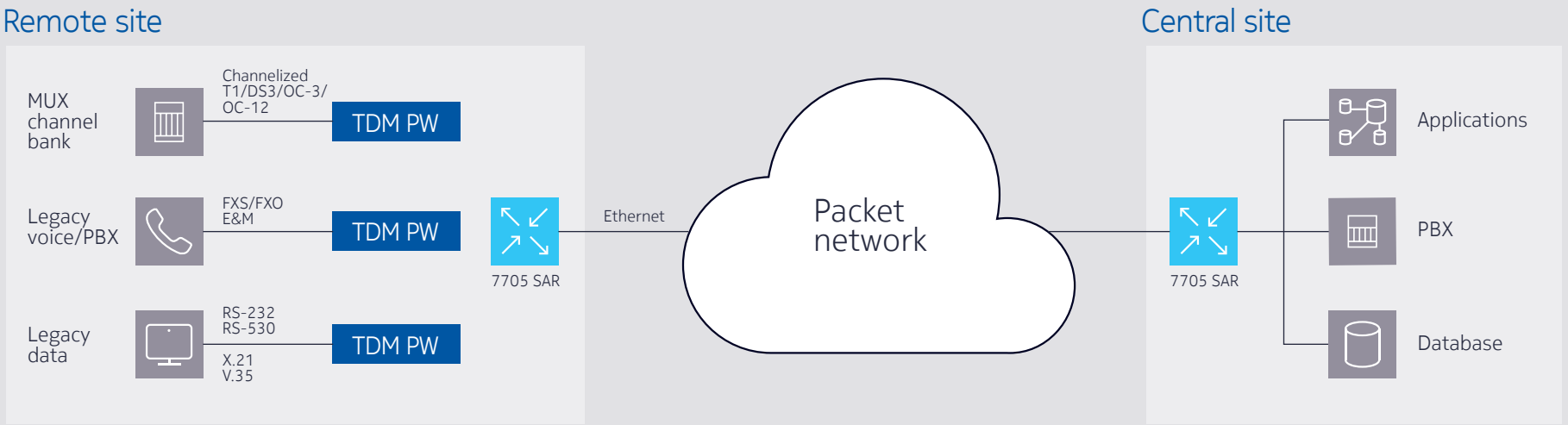
Nokia 7705 SAR

Convert legacy interfaces for IP/MPLS transport

The Nokia 7705 Service Aggregation Router (SAR) supports most common legacy data and voice interfaces, converting them into point-to-point TDM circuits (pseudowires) for transport across MPLS-enabled Ethernet (FE/GE/10GE) interfaces.

Figure 2. Network modernization with the Nokia 7705 SAR



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Nokia 7705 SAR

A complete platform for network modernization

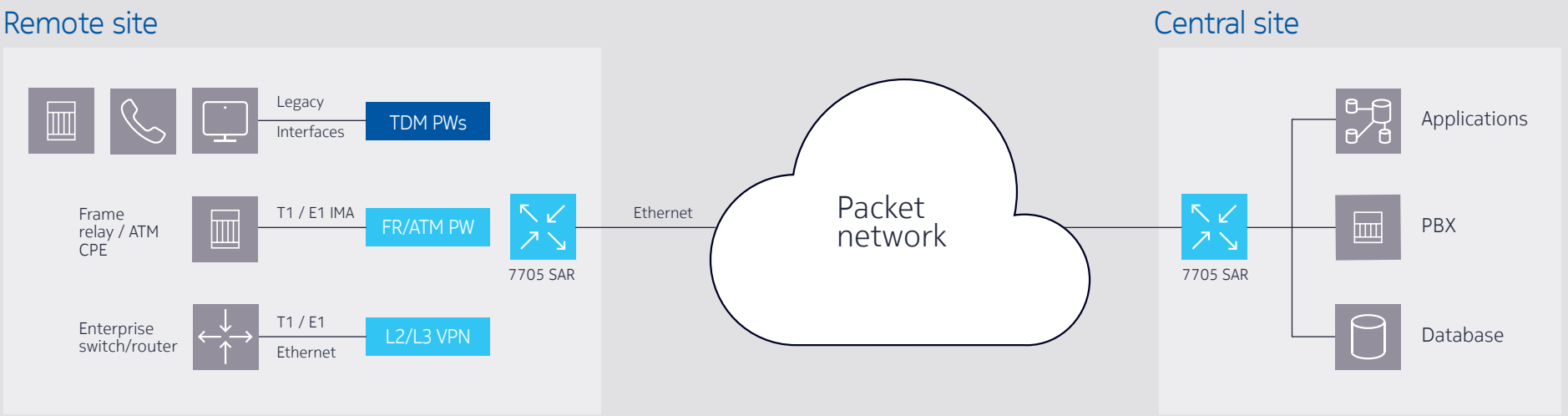
The Nokia 7705 SAR does more than just solve the TDM-to-IP migration challenge. It can also:

- Replace other legacy networking technologies, such as frame relay and asynchronous transfer mode
- Support advanced layer 2 VPLS/EVPN and layer 3 IP services
- Offer rapid service provisioning, management and troubleshooting via the Nokia Network Services Platform
- Enable a future evolution to software-defined networking

Despite these benefits, federal agencies that have relied on TDM and SONET/SDH technologies may be wary of migrating to an IP-based solution unless they get answers to three key questions:

- What about delay, jitter and synchronization?
- What about availability and resiliency?
- What about network security?

Figure 3. Ready for future services with the Nokia 7705 SAR



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What about delay, jitter and synchronization?

TDM applications require precise frequency synchronization across the network to prevent circuit errors such as frame slips and buffer overruns/underruns. For this reason, some users worry about the ability of IP/MPLS over Ethernet to meet stringent delay and synchronization requirements.

In fact, IP/MPLS provides assured quality of service characterized by deterministic delay and jitter. All TDM traffic can be classified as high-priority to ensure latency budgets are met consistently while network jitter is minimized and absorbed by playout buffer.

How the Nokia 7705 SAR solves the synchronization problem

Highly precise synchronization distribution often requires a mix of technologies to adapt to local conditions from one facility to the next. Some may have GPS receivers, for example, while others do not. Others may already have synchronization provided via a T1 interface for other tenants in the same building.

The 7705 SAR supports numerous synchronization technologies, including:

- External reference sources such as GPS or stratum 1 primary reference clock (PRC)
- Timing over packet technologies such as Packet Timing Protocol (IEEE1588) or adaptive and differential clock recovery
- Line timing such as synchronous Ethernet (ITU-T G.8261x), TDM trunks or internal stratum 3 clock
- Terminal timing (RS-232 and RS-530)

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What about availability and resiliency?

High network availability is key to mission success. At the heart of high availability is strong network resiliency. The speed at which SONET/SDH can recover from a network failure has become the measuring stick for any new communications technology.

IP/MPLS was architected to protect traffic with the same reliability and recovery speed as legacy SONET networks. It also supports multi-fault resiliency, meaning communications can be restored even when multiple failures occur (provided physical reachability exists).

How the Nokia 7705 SAR solves the availability problem

The 7705 SAR's built-in redundancy and traffic rerouting capabilities provide strong resiliency if a link or specific piece of equipment fails. Using a suite of dynamic routing and recovery capabilities (such as fast reroute), the 7705 SAR delivers service restoration in just tens of milliseconds.

Available in two modular form factors, the 7705 SAR provides not only power redundancy but also control and switch fabric redundancy, which allows the device to keep functioning even in the event of a control/switch module failure.

7705 SAR-18	7705 SAR-8
140 Gb/s (HD)	60 GB/s (HD)
40x 10Gb/s + 12 x 2.5 Gb/s adapter card slots	2 x 10 GB/s + 4 x 2.5 Gb/s adapter card slots
Up to 28 x 10GE ports Up to 136 x GE ports	Up to 12 x 10GE ports Up to 48 x GE ports
10 RU	2 RU

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What about network security?

TDM networks that use circuit switching technology are closed and timeslot-based (with channels reserved for specific applications), making it hard for hackers to get access and carry out cyberattacks. Open, standards-based IP networks that use packet switching technology are more vulnerable to threats. Layer 2 and layer 3 virtual private network (VPN) services, however, allow an IP/MPLS network to be segmented into many different closed domains, protecting from outside attacks.

Tunnel-based VPN communications also provide a first line of defense against illicit traffic injection or man-in-the-middle attack. Without specific tunnel information (such as the MPLS label) known only to network insiders, it is very difficult for an attacker to penetrate the tunnel and inject malicious traffic.

How the Nokia 7705 SAR solves the security problem

The 7705 SAR provides a robust set of security features to ensure network integrity in the event of session hijacking, spoofing and denial of service (DoS) attacks, including:

- An application-aware firewall that mitigates attacks such as DNS/ICMP replay
- Application-level gateways to ensure extra security for FTP/TFTP connections
- Hardware-based encryption capabilities (such as IPsec, network group encryption, advanced key exchange and distribution algorithms) to protect data confidentiality, integrity and authenticity, while preserving high throughput and minimizing latency

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Why choose Nokia as your partner?

The Nokia 7705 SAR has everything federal agencies like the DoD need to continue carrying out their missions as they migrate TDM applications to a converged IP/MPLS network.

With more than 530,000 chassis deployed globally, supporting mission-critical applications for defense, public safety and power utilities, the 7705 SAR is proven to meet all the key mission-critical requirements for robust, reliable and secure network connectivity:

- The ability to concurrently support new, bandwidth-intensive applications such as video surveillance, video conferencing and high-seed data transfer to meet both existing and future network requirements
- A strong set of security features, including firewalls, gateways and encryption
- JITC/FIPS 140-2 certified

Awards and accolades for the Nokia 7705 SAR

- APEX award, 2020
  Utility Technology Council
- Smart Grid Product of the Year, 2014–2017
  TMCnet – IoT Evolution World
- Smart Grid, Metering & Infrastructure Security Award, 2016
  European Smart Energy Awards
- Best Practices in New Product Evolution, 2015
  Frost & Sullivan
- Hot Product, 2014
  Association of Public Safety Communications Officials

#2
Edge routing vendor in North America

260+
IP/MPLS deployments for government and defence

1,130,000+
Service router platforms shipped worldwide

What's next?

When it comes to network migration and evolution, Nokia is a partner you can count on. Click here to discover more about the Nokia 7705 Service Aggregation Router.

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References

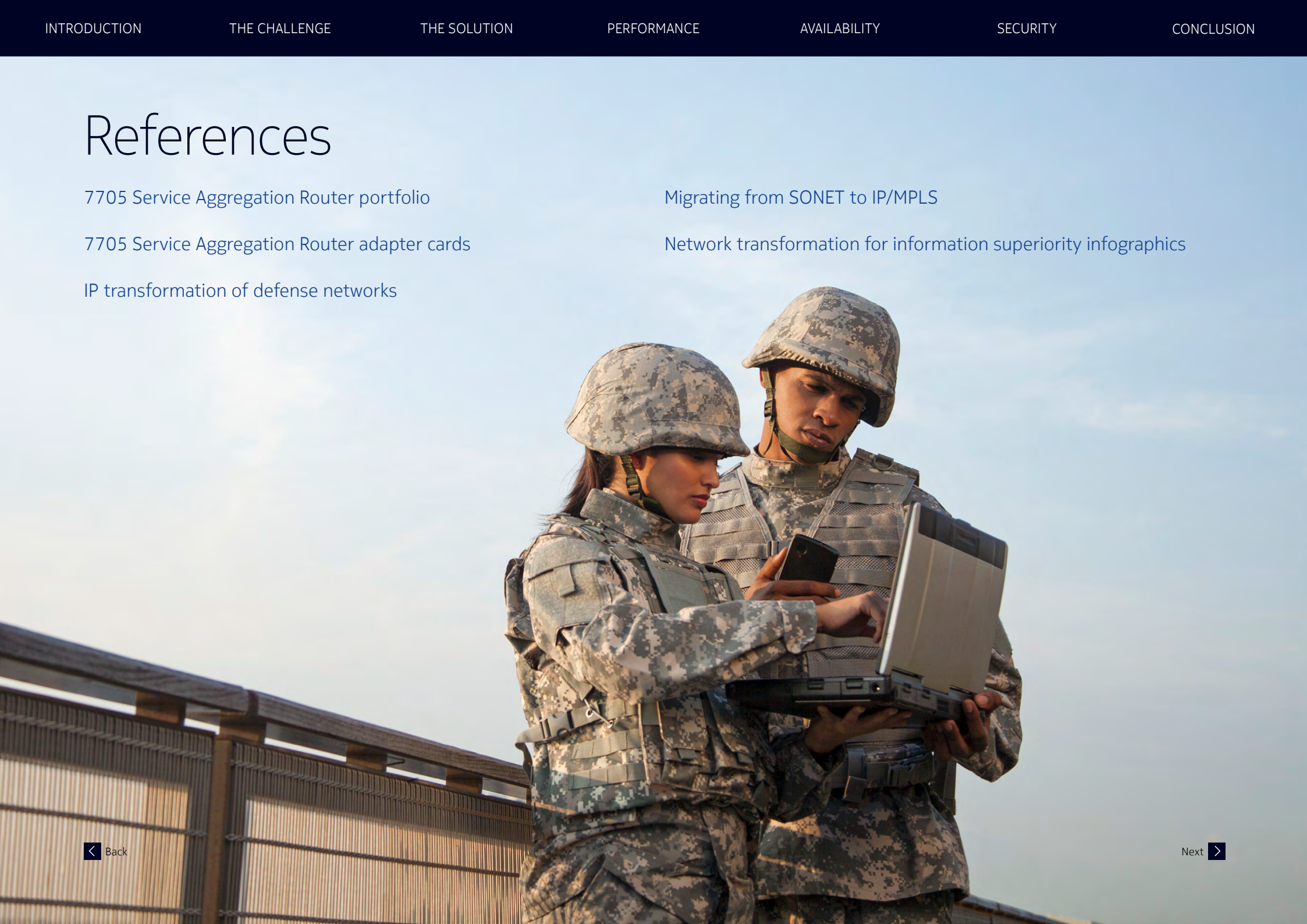
7705 Service Aggregation Router portfolio

7705 Service Aggregation Router adapter cards

IP transformation of defense networks

Migrating from SONET to IP/MPLS

Network transformation for information superiority infographics



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About Nokia

We create the technology to connect the world. Only Nokia offers a comprehensive portfolio of network equipment, software, services and licensing opportunities across the globe. With our commitment to innovation, driven by the award-winning Nokia Bell Labs, we are a leader in the development and deployment of 5G networks.

Our communications service provider customers support more than 6.4 billion subscriptions with our radio networks, and our enterprise customers have deployed over 1,300 industrial networks worldwide. Adhering to the highest ethical standards, we transform how people live, work and communicate. For our latest updates, please visit us online www.nokia.com and follow us on Twitter @nokia.

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