



White paper

Verizon, Ciena and Network Modernization

A Roadmap for Defense Agencies

verizon[✓]

In partnership with
ciena.

Network transformation doesn't need to be overwhelming.



Demand for data and connectivity in the DOD has increased exponentially, thus putting more pressure on networks to deliver high quality bandwidth. Multiple elements including new threats, high data usage sensors, and the increasing network centrality of the battlespace play a role in driving demand for bandwidth which requires more than just network upgrades, it requires a network transformation.

Working with industry partners who are familiar with the mission challenges that the DOD faces while adhering to proven methodologies helps ensure not only success, but an efficient transformation focused on reducing risk and maximizing return on investment (ROI).

External forces driving demand

Along with an explosion in basic bandwidth demand over the last few years, there are many initiatives increasing the need for network capacity. The DOD workforce has become more mobile, and this shift requires additional security measures to protect end-user devices. Emerging technologies including the Internet of Things (IoT), artificial intelligence (AI) and machine learning can impact network traffic as they help to reduce labor-intensive work, and shift workers from time-consuming processes to spending more time on higher-value work. Enterprises are migrating services and capabilities to the cloud while demanding high reliability and low latency. Plus, cybersecurity threats are always looming, compelling your network to grow smarter, be more agile, and be increasingly more responsive.

Benefits of network transformation

There are many benefits gained by the DOD from network transformational activities. New technologies can provide improved network availability and reliability, thus helping deliver reduced downtime. Increased bandwidth is available at a lower cost per bit as the capacity per fiber has increased. Additionally, a new modernized network is more cost effective, consuming less power and space.

Software automation empowers the workforce and provides operational benefits including automated responses with increased analytics to help make more informed decisions.

Finally, using the rich control and segmentation options provided by modern infrastructure, it is possible to efficiently consolidate many previously separate networks and missions on a common infrastructure. This is what the DOD's JADC2 program is striving to achieve.

Challenges to transforming the network

Network changes require a review of internal challenges such as security, technology obsolescence and ways to automate. All organizations must recognize and protect the mission critical information which requires stringent security measures. As networks have aged, older equipment reaches its end of life and cannot be upgraded, replaced, patched or in some cases even coexist in new network architectures, therefore requiring replacement. This is a particularly acute problem for DOD when dealing with legacy TDM platforms that use SONET/SDH technologies. Some of this older gear is an integral part of mission systems that cannot be easily decommissioned and thus TDM interoperability at the edge must still be maintained.

Having the ability to adapt legacy technologies to operate over modern converged infrastructure is a key challenge to transforming the network that must be addressed. Additionally, a new, improved network can take advantage of automation to enhance interoperability, speed-up provisioning, and improve performance monitoring.

Network transformation represents a complex change, and it is not easy for anyone. Even organizations with in-house planning and engineering teams struggle with the scale and complexity of these projects. Typical hold-ups include network visibility, budgetary restraints and an aversion to risk with so many constituents who rely on the network to always be available.

With a large existing network, often there is uncertainty in how to approach network changes. With multiple levels of data classification – and sometimes spotty documentation of the current as-built network – organizations struggle with evaluating technologies and determining the best approach to transformation. Lack of visibility can make accurate network inventories difficult to ascertain, which can create barriers that prevent the DOD's transformational projects from getting off the ground.

Modernization use case: Verizon has been there.

Several years ago, Verizon knew it needed to transform its network as it faced high maintenance costs from outdated legacy technologies found throughout that had become too costly and problematic to operate. As the legacy equipment was approaching end of life, it became harder to find spare parts. Some software updates were not available, and it was difficult to find people to work on the old equipment. This resulted in network components that were expensive to maintain, prone to outage, and not at the level of agility their customers demanded. A program was needed to ensure the network and services were always up and running.

In the meantime, legacy TDM lines scattered throughout the network became costly to manage, maintain and support. Verizon still needed to keep these critical services but realized that its customers could benefit from moving to a TDM-to-packet solution which would support both legacy TDM and modern packet-based services on a common infrastructure. This was found to be more cost-effective, scalable, dynamic, and simpler to own and operate. Customers could enjoy dramatically higher-speed services and lower recurring costs at the same or better performance of legacy TDM-based services.

Verizon originally wanted to convert the old network site-by-site but decided there were too many hurdles. An evaluation to place a new node in an old system to replace a legacy device, uncovered challenges with integrating the new architecture with the old and restrictions on features that were critical to success. These challenges would create a migration that could be disruptive to customers, taxing on network engineers to develop and test, and difficult for network operators to support these critical services.

Creating an overlay network which could be stood up and fully tested in small sections before migrating services had the highest probability for success. This meant keeping sections of the old network running while building the new sections. Once services were strategically moved off the old network onto those pre-tested sections, the legacy equipment was decommissioned providing savings on power, cooling, maintenance, and space, while addressing increased traffic demands on the network.

Benefits of Verizon's modernization activities

- Minimal impact to applications and end users, thus avoiding the exponential increase of maintenance windows that impact each circuit along each route (at every site) in a hybrid network.
- The new architecture wasn't affected or restricted by the capabilities of the old.
- Legacy devices didn't need any software programming resources to interwork in a parallel network. This increased the ability to complete the migrations faster and reduce the total project time and expense.
- Ability to sectionalize the network into small regional areas, making it more manageable, while keeping some of the same benefits of a site-by-site migration.
- The fallback plan was much easier and less impacting to applications and end users. The current services were unaffected by testing and problems that arose in standing up the new paths.
- There was less impact on the back-office integration work, than integrating the old and new networks.
- It enabled adherence to risk management objectives that weren't attainable otherwise.
- There was less cost in the overall project, with less time spent investigating problems or issues, and less impact to end users. Any additional upfront costs were supported by minimizing cost overruns, reducing the complexity, and less regression testing.

Ciena helped Verizon modernize.

To help accomplish such robust modernization, Verizon leveraged the skills of Ciena, a trusted partner who has transformed some of the world's most complex networks, to help address these challenges. Ciena's approach took a comprehensive view of Verizon's business strategy, priorities, market context, and goals, while translating them into actionable network outcomes. This collaboration helped to maximize ROI for Verizon—leveraging Ciena's insights and objectives based on deep industry experience, proven transformation methodologies, reliable equipment, and field-proven analytics tools to drive the desired outcomes.

Key steps in the successful network transformation

Strategizing – Verizon department leads and subject-matter experts worked in conjunction with Ciena to capture and evaluate goals; establish key success metrics; and amass, integrate, and analyze all necessary data to decide which approach would meet business objectives, minimize disruption, and maximize ROI.

Evaluating – Ciena and Verizon collaborated on the creation of a detailed digital baseline/single source of truth network by extracting and mapping network data from all sources, cleansing and normalizing information into a master database. This helped provide a critical foundation for analysis and decision making to create an optimal execution plan for Verizon.

Planning – Verizon and Ciena developed network use cases, while project managers and engineers worked closely with the technical and operations teams to plan the migration to ensure mission-critical services remained available throughout the process following rules and requirements for service availability, maintenance window time frames, and customer impacts.

Executing – The modernization teams spent significant time on strategy, evaluation, and planning, well before execution occurred. Skilled experts from Ciena helped Verizon with the on-time migration of several thousand circuits from legacy network infrastructure to a more scalable, efficient architecture with minimal disruption or downtime to legacy services.

Closure – Once teams determined Verizon's upgraded network was ready, there was a variety of closure activities

including an audit, Operating Support System (OSS) and Business Support System (BSS) updates and the decommissioning of almost 1,000 network elements (NEs) resulting in ~\$1.8M in annual power savings alone. Verizon staff was trained, and Ciena helped monitor and guide the continuing improvement of the newly modernized network.

Post install – The expert-driven approach Verizon jointly executed with Ciena helped ensure the availability of target capacity during maintenance windows, keeping Verizon external customers and internal workforces happy. Ciena was able to validate the Network Operations Center's (NOC) ability to effectively troubleshoot. Lab testing helped make the transition smoother and is ongoing for new feature sets. Training and handover plans were provided as Verizon began to assume network responsibilities. Ciena continues to support additional modernization needs; helping manage back-office operations, network upgrades and decommission legacy systems.

In summary

A changing market environment and new applications demand high quality bandwidth with no disruptions. To meet these demands, Verizon needed to transform their network with assistance from an experienced partner. The complexity of the existing network, the path to move forward and the criticality of maintaining reliable services during transformation were only a few of the challenges Verizon faced.

With Ciena, Verizon was able to build a parallel network – minimizing disruptions and reducing risk to end users – that was less complex to roll out and made service migration easier. This led to increased operating efficiency both for TDM services and for next-generation IP and Ethernet services. Working in conjunction with an experienced partner, the Verizon team was able to continue to maintain the network and didn't need to increase staff for the migrations.

All in all, Verizon's journey of modernization can help enhance the DoD's roadmap for digital transformation.

[Experience how](#) Verizon is helping transform the DoD. Strategically and securely.

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