TIME DIVISION MULTIPLEXING TRANSFORMATION

BEST PRACTICES

Your Path to Success: What's Essential

The Department of Defense (DoD) mandate to migrate from Time Division Multiplexing (TDM) to Internet Protocol (IP)-based communications aims to enhance operational capabilities, improve cybersecurity, and ensure the DoD remains agile and effective in addressing evolving mission requirements. While the mandate set a firm deadline, migration efforts are ongoing across many agencies as they continue to transition to IP-based solutions. The carrier price increases of legacy TDM circuits—ranging from 100% to 1200% current rates—are exacerbating the need for TDM transformation as legacy services have reached end-of-support.

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Key Components of TDM Transformation

- Reducing Commercial Lease Costs

  — Discontinue and cancel funding of unused circuits

  — Transition to Defense Information Systems Network (DISN) IP Transport

  — Adopt cost-effective, highly efficient, aggregated Commercial Ethernet Gateway (CEG) solutions

- Transitioning Legacy Circuits to an IP Transport Solution for Voice and Data

  — Implement IP Transport for Next-Gen Voice and Data circuits

  — Deploy Next-Gen IP Transport Customer Edge (NGT-CE) solution for enduring TDM requirements

- Performing Infrastructure Upgrades as Required

  — Update Inside Plant (ISP)/Outside Plant (OSP) base infrastructure to support high-speed circuits

- Implementing a Robust Ethernet Service

  — Defense Information System Agency's (DISA) CEG initiative provides a flexible, point-to-multipoint network design through Ethernet Virtual Private Line (EVPL) service, enhancing connectivity and network performance

Achieving Your Goals: The Necessary Steps

TDM transformation requires meticulous planning and execution to minimize service disruptions and maintain mission-critical operations. The steps involved include:

Step 1. Planning & Assessment

- **Inventory Existing TDM Infrastructure**

  - Identify all legacy TDM circuits through Telecommunication Services Enterprise Acquisition Services (TSEAS) Inventory and Billing Information (TIBI) and other databases
  - Conduct surveys to locate legacy Private Branch Exchange (PBX), TDM, Synchronous Optical Networking (SONET), and associated equipment
  - Evaluate base switching and routing infrastructure for Voice over IP (VoIP) capabilities
  - Document dependencies on mission-critical systems

- **Assess Operational & Security Requirements**

  - Engage with DISA, mission owners, base-level communications offices, and other stakeholders
  - Classify services by priority, complexity, and security requirements
  - Align with DoD Unified Capabilities Requirements (UCR) and Zero Trust Architecture (ZTA) initiatives
  - Identify real-time, latency-sensitive, or encrypted traffic that requires specialized handling
  - Conduct a risk assessment for IP-based solution transition

- **Develop a Migration Roadmap**

  - Establish milestones and timelines for transitioning systems
  - Align with DISA's Unified Capabilities and DoD IT Modernization Strategies

- **Perform a Cost-Benefit Analysis**

  - Engage stakeholders across service branches and agencies
  - Define TDM circuit savings to support TDM migration costs

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Step 2. Infrastructure Modernization

- **Upgrade Network Backbone to Support IP Traffic**
  — Implement high-speed Ethernet access circuits through the CEG contract
  — Ensure Quality of Service (QoS) for real-time voice and video traffic

- **Deploy Voice over IP (VoIP) & Unified Communications (UC)**
  — Replace TDM-based phones with VoIP solutions
  — Implement VoIP media gateways
  — Implement cloud-based or on-premises Session Border Controllers (SBCs)
  — Integrate Enhanced 911 (E911) and Next Generation 911 (NG911) capabilities to ensure compliant, location-aware emergency calling over IP networks

- **Enable Seamless Migration for Enduring Circuit-Based Requirements to IP Transport**
  — Install service aggregation platforms from Nokia or Ciena to support a wide range of interfaces, including TDM, SONET, Synchronous Digital Hierarchy (SDH), serial data, and voice

- **Enhance Cybersecurity Measures**
  — Comply with the DoD's Zero Trust Architecture initiatives

Step 3. Transition & Integration

- Conduct pilot testing and validation
- Implement a phased deployment approach with fallback options
- Train personnel on VoIP, Session Initiation Protocol (SIP) Trunking, and UC solutions
- Leverage By Light's Network Operations Center (NOC) to address migration challenges

Step 4. Optimization & Decommissioning

- Monitor and fine-tune VoIP and UC solutions for efficiency
- Decommission Legacy PBXs, Integrated Services Digital Network (ISDN) circuits, and other TDM infrastructure

Step 5. Compliance & Continuous Monitoring

- Verify compliance with DoD standards, directives, Security Technical Implementation Guides (STIGs), and DoD Information Network (DODIN) Approved Products List (APL)
- Implement continuous monitoring

Partnering for Success: How We Support You

By Light has spearheaded TDM Elimination initiatives for DISA and the U.S. Navy, successfully transitioning 176 legacy circuits to 136 CEG circuits. This transformation boosted bandwidth from 24 GB to 158 GB, delivering a $5 million cost avoidance. Our core contributions to TDM modernization include:

- **Global Resource Pool**
  - A team of 250+ DoD-cleared engineers and installation technicians with global reach

- **Circuit Analysis**
  - Inventory/survey current circuits to assess potential network and system vulnerabilities
  - Analyze all Government-owned OSP pathways and cable density for critical circuits to validate redundancy and diversity
  - Document survivability solutions for mission-critical needs
  - Develop a circuit cutover strategy that outlines technical steps and considers stakeholder requirements for scheduled interruptions

- **Unified Capabilities**
  - Implement regional-based voice ecosystems capable of providing VoIP services to multiple subscribers
  - Replace existing local voice systems and migrate services to the DISA Voice Internet Service Provider (VISP)/Voice Cloud Access Point (VCAP) service

- **Network Survey and Design Engineering**
  - Conduct thorough audits on existing OSP infrastructure, including pathways and termination points
  - Establish a baseline as-built reference capturing detailed layouts of cable trays, conduits, and raceways
  - Design a compliant and innovative base routing and switching infrastructure to support current and future transport, access, and service delivery requirements

- **IT Procurement Service**
  - Procure and track all Hardware (HW) while managing supply chain risk following documented Supply Chain Risk Management (SCRM) processes
  - Ensure the selected HW and material is compliant and aligned with the approved designs

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- **ISP Support**
    - Prepare sites by installing racks, cable distribution systems, cabling, power systems, and grounding
    - Install and power on devices, perform connectivity checks, and execute STIG scans
    - Perform end-to-end testing on all ISP fiber optic cables, connections, splices, and terminations
    - Label all cabling and equipment in accordance with site standards
    - Execute detailed cutover plans, ensuring a safe and efficient migration

- **OSP Solutions**
    - Implement fiber-deep mesh architectures to extend diverse fiber paths closer to end users
    - Install new fiber paths (conduits, fiber optic cables, manholes, handholes)
    - Utilize Geographic Information System (GIS) solutions for accurate data capture and location mapping, providing a comprehensive overview of base-wide OSP
    - Deploy specialized teams to handle local permitting and regulations

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CLT-147-01 | April 25, 2025