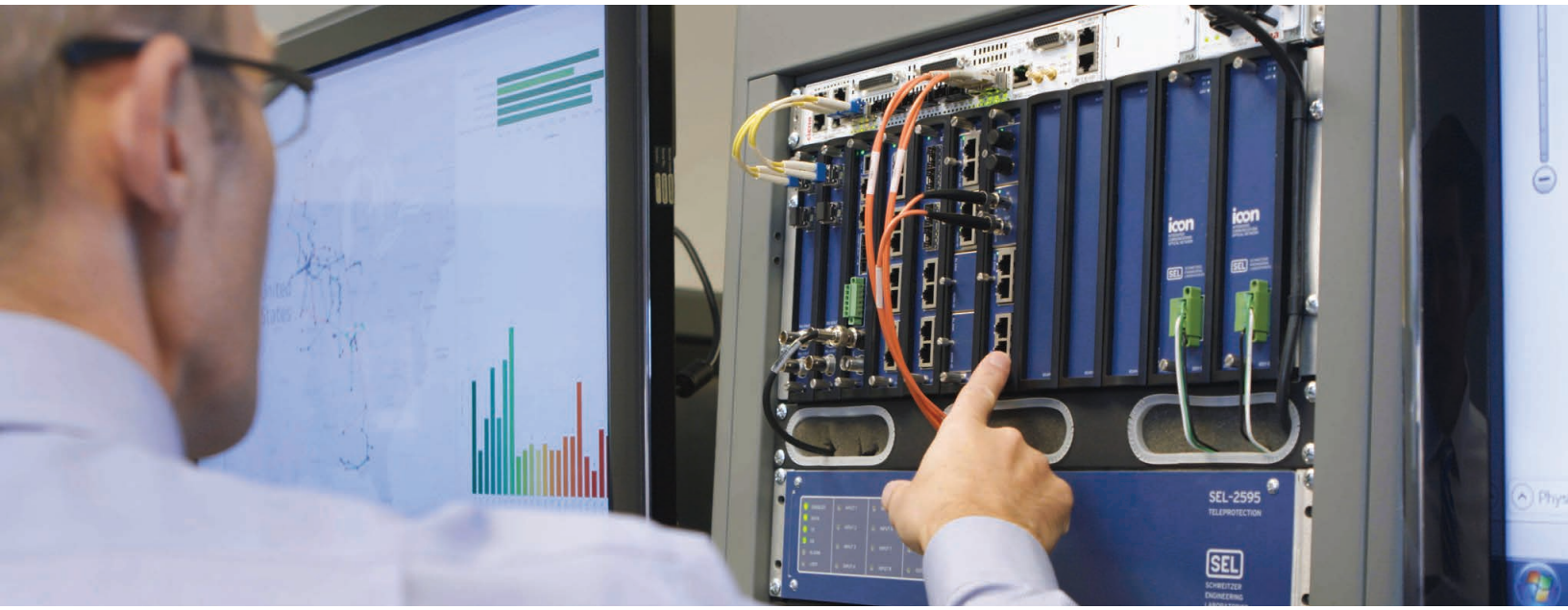
# ICON® VSN for Digital Leased Lines




## Transition from analog to digital leased lines and improve protection performance

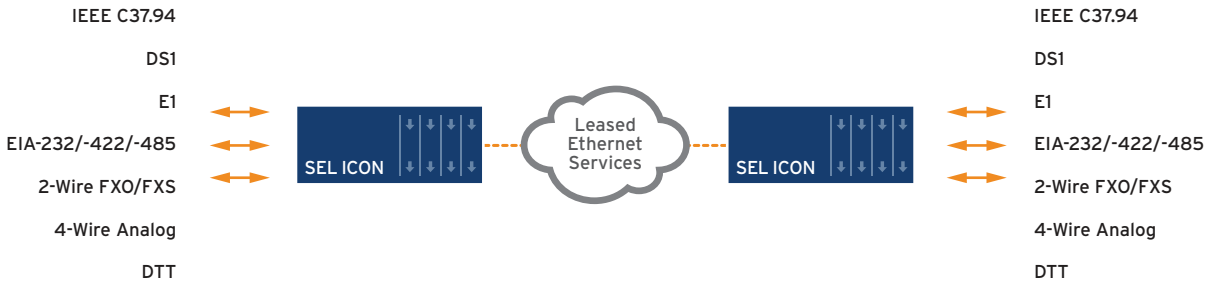
- Deliver <10 ms latency performance for demanding applications like direct transfer trip.
- Retain existing protective relay equipment by adding a cost-effective SEL ICON Integrated Communications Optical Network to each substation.
- Address analog leased line obsolescence concerns.
- Reduce leased line cost and improve reliability by switching to digital.

# Switch to Digital

**ICON virtual synchronous networking (VSN) makes it easy to migrate from analog to digital leased line services without compromising protection.**

With the major telecom carriers announcing the end of service for leased analog lines, you may be facing a forced transition to leased Ethernet services. Switching to packet-based networking makes it challenging to maintain adequate latency and asymmetry performance for critical analog circuits. The ICON is the solution.

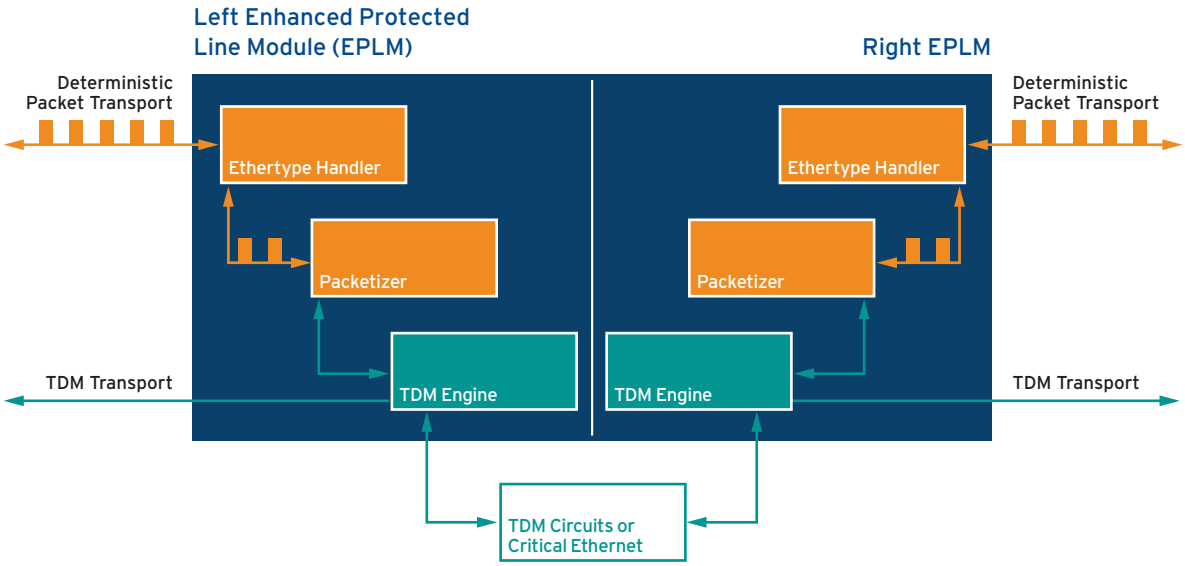
By simply adding an ICON at each end of a digital leased line, you can get the latency, asymmetry, and failover necessary to continue using sophisticated protection schemes like direct transfer trip (DTT).




You can combine ICON deterministic transport with dedicated analog drop interfaces, including 2-wire FXO/FXS, 4-wire analog voice frequency, and DTT. These interfaces allow you to preserve existing analog end equipment and create a low-latency circuit through your digital leased line to maintain end-to-end communications channel performance for critical applications. With the ICON, you can achieve end-to-end latency of less than 5 ms for a contact transfer across leased Ethernet service.

# Performance for Protection Networks

ICON VSN technology allows you to use Ethernet transport but preserve performance for time-division multiplexing (TDM) circuits. And it works with any packet technology that your telecom carrier has adopted for core transport, including Multiprotocol Label Switching (MLPS) and Carrier Ethernet.




The ICON efficiently packetizes TDM traffic for Ethernet transport. It does not packetize at the DS0/E0 level; it packetizes at increments of an STS (i.e., STS 1—12) and passes that through an Ethertype handler. For transport itself, the ICON uses an innovative method of generating regularly spaced Ethernet frames with each containing packetized TDM information. By maintaining regularly spaced transport, the ICON maintains its synchronous TDM engine, ensuring fast data recovery. The combination of the efficient packetization and regularly spaced transport allows the synchronous transfer of data across a packet infrastructure, preserving TDM performance over the packet-based network.

# ICON Specifications

| General | | |
|---|---|---|
| **Line Modules** | 8022-01 Enhanced Protected Line Module | SFP Ports A/B/C/D: 155 Mbps, 622 Mbps, 1 Gbps, or 2.4 Gbps<br>IRIG-B out: 2 BNC |
| **Server Module** | 8030-01 Server Module | NMS ports: USB, RJ-45<br>GPS antenna: TNC<br>IRIG-B in: BNC<br>PTP in: Telecom Profile |
| **Chassis and Power Modules** | 19-Inch Rack Mount Chassis | |
| | 8001-01 Full 19-Inch Chassis | 10 available slots |
| | 8011-02 HV AC/DC 120—240 V, Terminal Block | Supply voltage: 102—264 Vac, 50/60 Hz; or 88—300 Vdc |
| | 8011-03 MV DC 24—48 V, Terminal Block | Supply voltage: 19—58 Vdc |
| | Half-Width Cube Chassis | |
| | 8002-01 Half-Width Chassis | |
| | 8010-01 HV AC 120—240 V, IEC C6 Line Cord | Supply voltage: 102—264 Vac, 50/60 Hz |
| | 8010-02 HV AC/DC 120—240 V, Terminal Block | Supply voltage: 102—264 Vac, 50/60 Hz; or 88—300 Vdc |
| | 8010-13 MV DC 24—48 V, Terminal Block | Supply voltage: 19—60 Vdc |
| **Access Modules** | 8036-01 Ethernet Bridging Access Module | 100/1000 Ethernet ports: 4 SFP<br>10/100/1000 Ethernet ports: 4 RJ-45 |
| | 8036-02 Ethernet Bridging Access Module With PTP | 100/1000 Ethernet ports: 4 SFP<br>10/100/1000 Ethernet ports: 4 RJ-45<br>PTP out: Power Profile |
| | 8051-21 Nx64F Multimode Submodule | ST ports: 1 Rx, 1 Tx<br>Standard: IEEE C37.94 multimode |
| | 8051-22 Nx64F Single-Mode Submodule | ST ports: 1 Rx, 1 Tx<br>Standard: IEEE C37.94 single-mode |
| | 8053-11 Data Async Submodule | Ports: 2 RJ-45<br>Standards: EIA-232, EIA-422, EIA-485 |
| | 8053-12 Async-CB Submodule | Ports: 2 RJ-45<br>Standards: EIA-232, EIA-422, EIA-485 |
| | 8055-01 422 Sync Submodule | Port: 1 RJ-45 |
| | 8056-01 G.703 Submodule | Port: 1 RJ-48C |
| | 8065-11 4-Wire VF Submodule | Ports: 2 RJ-45 |
| | 8065-12 4-Wire VF Bridging Submodule | Ports: 2 RJ-45 |
| | 8066-01 2-Wire FXS Submodule | Port: 1 RJ-11 |
| | 8067-01 2-Wire FXO Submodule | Ports: 2 RJ-11 |
| | 8041-01, -04 Transfer Trip Module | Commands: 4 |
| | 8057-11 DS1 Async Submodule | Ports: 4 RJ-48C |
| | 8057-12 DS1 Sync Submodule | Ports: 4 RJ-48C |
| | 8057-03 DS1 Psync Submodule | Ports: 4 RJ-48C |
| | 8057-14 E1 Async Submodule | Ports: 4 RJ-48C |
| | 8057-15 E1 Sync Submodule | Ports: 4 RJ-48C |
| **System Specifications** | Network Topologies | Linear and multiple rings with single or dual interconnected nodes, plus linear spur and subtended ring topologies |
| | Path Switching Time | <5 ms |
| | Convection-Cooled | No fans |
| | Operating Temperature | —20° to +65°C (—4° to +149°F) |
| | Mounting | 8", 19", or 23" rack or panel mount |

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