The AnyWAN™ system-on-a-chip (SoC) URX850, URX851, and MxL25641 devices offer multiple 10G and 2.5G high-speed interfaces, high-performance packet accelerators, and embedded CPU cores. The SoCs are suited for 10G home routers and MultiWAN home gateway units (HGUs) with 10G fiber WAN and tri-band Wi-Fi 6/6E/R2 and Wi-Fi 7.

**Universal and Ultra-Scalable**

The ultra-scalable architecture provides broadband service providers and original equipment manufacturers (OEMs) or original design manufacturers (ODMs) with a versatile platform for home gateways and SMB customer premise equipment (CPE). This platform covers a wide range of value tiers and WAN technologies such as fiber, DOCSIS cable, Ethernet, 5G fixed wireless access (FWA), and DSL or G.fast. Developers can get access to a versatile hardware and software development kit for multi-gigabit home gateways with 10G PON, 10G Ethernet WAN and LAN, 2.5G Ethernet WAN and LAN, DSL or G.fast, Voice FXS, USB 3.2, and tri-band Wi-Fi 6E R2 and Wi-Fi 7.

The URX850/URX851/MxL25641 AnyWAN Broadband SoCs are software compatible. Their design can easily be modified for use with alternative WAN and LAN configurations. MaxLinear’s board support package (BSP) provides a unified base for openWRT and Yocto-based software development kits such as prplOS and RDK-B.
AnyWAN™ SoCs URX850, URX851, and MxL25641

One BSP: Any WAN, Any LAN, Any Software

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<tr>
<th>SDK</th>
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<th>prpl</th>
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<td>Build System</td>
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<th>BSP</th>
<th>Router</th>
<th>Fiber HGU</th>
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<th>DSL/G.fast</th>
<th>5G Wireless</th>
<th>MultiWAN</th>
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<tbody>
<tr>
<td>URX851, URX850</td>
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<tr>
<td>MxL25641</td>
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All In: High Level of Integration

A high level of hardware integration and 16nm process technology enable cost-efficient and power-efficient, and yet high-performance, home gateways. The SoCs use an innovative network-on-chip architecture for more efficient interconnection between the interfaces, packet accelerators, CPUs, and other hardware blocks on the chip.

The URX850 and URX851 SoCs embed four x86 cores, four 2.5Gbps Ethernet PHYs, four configurable high-speed I/Os (XFI, PCIe, SATA), four additional PCIe interfaces, and one additional high-speed I/O with 10G PON or Ethernet MAC. Including the integrated 2.5G Ethernet PHYs, a total of 9 MACs can be used simultaneously.

The MxL25641 SoC embeds two x86 cores, four configurable high-speed I/O (XFI or PCIe), one USB interface, and one additional high-speed I/O with 10G PON MAC.

Best-in-Class Performance

The embedded packet processor uses quality of service (QoS) handling and enables packet routing to be fully CPU-offloaded for common networking and tunneling protocols including tri-band Wi-Fi 6E and for Wi-Fi 7. Even IPsec or VPN tunnel endpoint termination is accelerated up to 10Gbps.

While the main use case is Telco Service Provider and Cable MSO gateways with high-end tri-band Wi-Fi 6E or Wi-Fi 7 configurations, the SoCs can also be applied in similar applications such as SMB gateways, NAS storage devices, distribution point units, and cellular small cells.

TOOL PACKAGE

- Development kit that supports Wi-Fi 7 and Wi-Fi 6E tri-band, 10G PON, DSL/G.fast and Voice
- Common board support package (BSP) for openWRT and Yocto build systems

INTERFACES

URX850/URX851

- Integrated 10G PON MAC / XFI (URX851 only)
- Integrated XFI WAN (URX850)
- 4 x PCIe Gen4/XFI/SGMII/USXGMII/SATA
- 4 x PCIe Gen3
- 4 x 2.5 GE PHY integrated
- 2 x USB 3.2 Gen2
- eMMC 5.1 HS400

MxL25641

- Integrated 10G PON MAC / XFI
- 4x PCIe gen4/XFI/SGMII
- 1x USB 3.2 (5 Gbps)
- eMMC5.1

URX850/URX851/MxL25641 OTHER INPUTS/OUTPUTS (I/Os):

- GPIO, UART, I2C, MDIO, SPI, I2S, SD-Card, QSPI

STANDARDS

- ITU-T PON BBF.247
- TPM 2.0 (ISO/IEC 11889)
- IEEE 802.1AR Secure Device Identity
- IEEE 1588v2 Precision Time Protocol (PTP)
- ITU-T G.8262/Y.1362 Synchronous Ethernet
- IEEE 802.3bx 2.5GBASE-T Ethernet
- FIPS 140-2/3 based Crypto including TRNG
- ITU-T/IEEE Embedded 10G PON MAC
Play it Safe: State-of-the-Art Security

Hardware security is at the heart of the URX850, URX851, and MxL25641 SoC design. The user-friendly security meets the highest standards of home and SMB gateways and is hardware-accelerated. Secure boot with root-of-trust transfer allows you to take full ownership of the device. A dedicated secure enclave, separated from the CPU cluster, provides a trusted execution environment, one-time programmable key and asset store, secure storage, hardware-based true random number generator, and hardware-accelerated ciphers.

Hardware Virtualization: Just Like a Server

The AnyWAN™ SoC URX850, URX851, and MxL25641 devices combine the benefits of traditionally lean and efficient home gateway SoC architectures with the performance and scalability of x86 CPU cores. While all routine networking traffic is fully CPU offloaded, the CPU remains free to perform software-centric and virtualized services. The x86 CPU benefits from a strong developer community, large software ecosystem, hardware virtualization, and leading container technologies. The powerful CPU cluster with two (MxL25641) and four URX850 and URX851 64-bit cores and up to 2MB of L2 cache provides developers access to the proven x86/64 instruction set, including powerful extensions such as SSE4.2, AES-NI, VT-x2, and EPT.

Active Power Management

The URX series features the most advanced adaptive power management capabilities built into the silicon hardware. State-of-the-art active power management techniques have been implemented to design the SoCs. They scale power consumption of the CPU, hardware accelerators, and interfaces dynamically to the performance needs, and hence minimize power consumption. Examples are dynamic frequency scaling, clock gating, power gating, power state control, Linux thermal zone concept, and dynamic link control to influence PHY link states.

Application Examples
SOC FEATURES

URX850/URX851/MxL25641

- Layer 2-4 wire-speed packet performance
- Packet processor that enables hardware-accelerated full central processing unit (CPU) offload with MaxLinear Wi-Fi, DSL, PON, and Ethernet
- Flash: Boot from NAND or eMMC
- Active power management with dedicated energy processing unit
  - Dynamic clocking/domain shut-off: frequency scaling, clock gating, power gating
  - Power state control: Active, Active/Idle, C6FS, D-states, C-states/P-states, EU Code of Conduct (CoC), energy-related products (ERP)
  - Thermal management: Linux thermal zone concept, cooling methods such as external sensors (PCIe devices), governors
  - Software modes: Linux system suspend/runtime suspend
  - Link control: influence PHY link states dynamic voltage and frequency scaling (DVFS)
- Voice DSP and PCM/SPI interfaces for FXS and DECT support

Product Information

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<td>URX851</td>
<td>SoC: Quad-Core, PON MAC, 4 × 2.5GE PHYs + 8 HSIOs</td>
<td>99LS51</td>
<td>FCBGA-837 (24x26)</td>
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<tr>
<td>URX850</td>
<td>SoC: Quad-Core, 4 × 2.5GE PHYs + 9 HSIOs</td>
<td>99L550</td>
<td>FCBGA-837 (24x26)</td>
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<tr>
<td>MxL25641</td>
<td>SoC: Two Core, PON MAC, 5 HSIOs</td>
<td>MxL25641-AV-T</td>
<td>FCBGA-577 (17x17mm)</td>
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<tr>
<td>DevKit</td>
<td>AnyWAN™ Hardware Development Kit URX851 (Triband Wi-Fi 7)</td>
<td>URX851-HDK-2</td>
<td>Board and HDK</td>
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<td>DevKit</td>
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<td>Board and HDK</td>
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<td>DevKit</td>
<td>AnyWAN™ Development Kit URX851 EVK-1 (Wi-Fi 6E with VRX619 for DSL/G.fast)</td>
<td>999J1P</td>
<td>Board and HDK</td>
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<td>MxL31712</td>
<td>Description: Single-chip MAC+PHY Triband 802.11ab 4+4+4</td>
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<td>WAV615</td>
<td>802.11ax 2.4GHz 4 × 4 up to 1.14Gbps PHY rate</td>
<td>99B015</td>
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<td>WAV665</td>
<td>802.11ax 5−7GHz (up to UNI8) 4 × 5 up to 4.8Gbps PHY rate</td>
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<td>974934</td>
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<td>MoCA 2.5 coaxial networking IC</td>
<td>MxL3710-AQ-R, MxL3710-AQ-T</td>
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<td>SLC220</td>
<td>2-channel FXS subscriber line interface circuit</td>
<td>947705</td>
<td>VQFN-68 (8x8)</td>
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<td>MxL86249C</td>
<td>2.5G Ethernet PHY (4 port), USXGMII-M</td>
<td>MxL86249C-ABE-R</td>
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