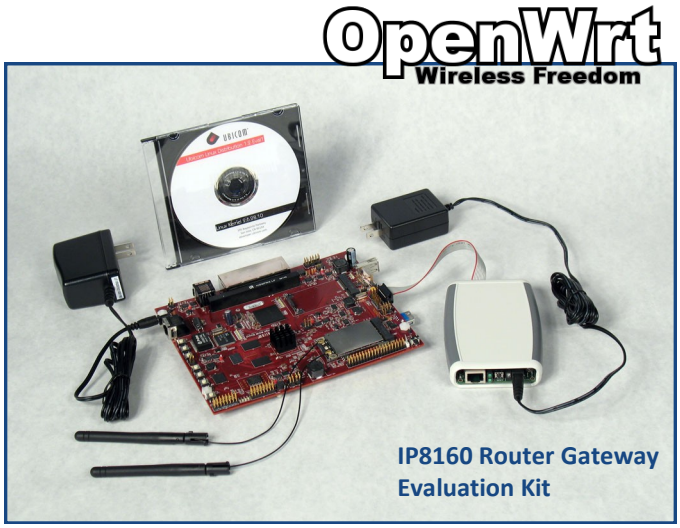
Ubicom IP8100 OpenWrt Router

Reference Design

The Ubicom IP8100 Router Reference Design is an industry standard, Linux-based, networking solution that is ideal for a broad range of high-performance, low-cost applications for consumer, service-provider, and small-business network-infrastructure devices.

For more information about IP8100 series network processors, please refer to the IP8100 Product Brief.

The router reference design includes the Ubicom's IP8100 Router Evaluation Board, OpenWRT-based Router SDK, and complete documentation that enables OEMs and ODMs to easily customize high quality products and bring them to market quickly.



Hardware Reference Design

The Router Evaluation Board is powered by the Ubicom IP8100 processor and includes the following features:

- High performance
  - 1 Gbps routing on OpenWrt
- Security engine (up to 150 Mbps VPN on OpenWrt)
- 4 x Gigabit Ethernet LAN ports
- 2 x Gigabit Ethernet WAN port
- 2 x PCIe 2.0 connectors
- USB 3.0 and 2 x USB 2.0 ports
- UART serial console; debug port
- Expansion connectors: LCD display, SLIC controller
- Advanced power management

OpenWRT Router SDK

The OpenWRT SDK from Ubicom is an industry standard, Linux-based, open-source router platform that includes full-featured router software and complete software tools and development environment. To ensure the highest quality router platform, the SDK goes through a rigorous software quality assurance cycle that includes complete functional router tests, regression testing, industry standard pre-certification testing, and white-box and black-box testing. (SDK Test Report is available in a separate document).

In addition to being the most stable router platform in its class, Ubicom OpenWRT SDK comes with value-added features, such as StreamEngine™ automatic QoS and VPN middleware, which provide differentiating features for manufacturers.

- Operating system
  - Linux Kernel 2.6.28 with SMP enabled
- Bootloader
  - U-boot
  - Micro-boot layer
- Device drivers (already ported and functional)
  - Ethernet switches
    - Atheros AR8316
    - Broadcom BCM5395
    - Vitesse 7395
  - Wi-Fi
    - Atheros AR9160/AR5416
    - Ralink iNIC (via RGMII)
  - 3G
    - Qualcomm 3G USB modem from Sierra Wireless/ATT
  - SLIC
    - Silicon Labs Si3215 and Si3050
  - IP8100 on-chip peripherals
    - 2x PCIe 2.0, 2x USB 3.0 and 2.0, 2x RGMII, 2x SDIO, 2x LCD Controllers, SPI, I2C, and PCM/SLIC
- Software Tools
  - Standard GNU toolchain for Ubicom32™ ISA
  - GCC 4.4.0 compiler
  - GDB application debugging
  - Ubicom Profiler tool

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Ubicom IP8100 OpenWrt Router

IP8K-MB-RGW

Router Software

- Status
  - WAN – including WAN connectivity, WAN IP, default gateway, and DNS servers
  - LAN – LAN IP address and DHCP server status
  - Wireless LAN – SSID, channel, 802.11 mode
  - DHCP LAN clients list
- Basic Internet
  - Supports static IP or DHCP client
  - Supports WAN protocols PPTP, L2TP, and PPPoE
  - Allows the user to manage Ethernet mode selection
  - MAC address cloning – WAN interface can use the MAC address of network adapter in your computer.
- Basic LAN
  - DNS Relay – router can be DNS server for LAN
  - DHCP server assigns IP addresses to LAN clients
  - DHCP reservations – User can reserve DHCP client address for particular device
- Wireless 802.11n
  - Allows wireless setup including SSID, channel, mode
  - WPA/WPA2 wireless encryption and authentication
  - Wireless Protected Setup (WPS) – easy method to connect wireless devices
- File and Media Sharing
  - Shares hard drive connected to the router with CIFS
  - Shares connected media files via UPNP
- Advanced Firewall
  - Virtual Server and Port Forwarding – provide users access to services on the LAN such as FTP, Web, or game servers.
  - Port Triggering – opens single or multiple ports on the router when the router senses data sent to the Internet on a "trigger" port or port range
  - Stateful Packet Inspection (SPI) – helps to prevent attacks such as Denial of Service
  - DMZ – expose LAN device to requests from Internet
  - ALGs (Application Layer Gateways) – enable some protocols or applications to work with NAT
- QoS with StreamEngine™
  - Automatic WAN QoS and bandwidth measurements
- Access Control
  - Prevents LAN clients from accessing certain websites
  - Prevents access from certain MAC address
  - Prevents connection from certain IP addresses
- Advanced Routing
  - Allows static routing-table entries
  - Network Address Translation (NAT)
- Advanced Networking
  - Allows LAN clients to open ports via UPnP
  - Enables WAN IP address to be pinged from the WAN
  - Enables LAN clients to receive multicast packets
  - Dynamic DNS support
- Management
  - Router firmware can be upgraded via the web UI
  - Provides system log information
  - User can reset router to factory default configuration
  - Router can receive accurate NTP time over internet
- VPN
  - Implements the IPSec and IKE protocol with optimizations for Ubicom crypto engine
  - Implements user level SSL VPN endpoint that is optimized for Ubicom crypto engine
  - Implements encrypted packets over L2TP or PPTP

Router Software Quality

Ubicom network processors have been deployed in over 12 million network infrastructure products since 2002. Ubicom has invested in advanced test equipment and engineering expertise to deliver the highest quality and most robust Router SDK to manufacturers. Around 40,000 test cases are applied to the Router SDK to ensure quality.

- LTP (Linux Test Projects)
- Toolchain torture suite
- Nightly Regression Tests
  - Linux Test Projects, POSIX, OpenSSL, Memory Protection Units, BusyBox , Kernel libraries , P2P NAT Routing, Samba tests, Processor benchmark tests (Dhrystone), Wireless performance (cabled), CD-Router, StreamEngine, Router functionality
- Router System Level Tests
  - Functional router tests
  - QoS tests
  - Bittorrent stress testing
  - Max. number of simultaneous TCP connections
- Performance Tests
  - VPN Performance
  - Wireless Performance
  - Peer to Peer Routing Performance
- Industry Standard Pre-Certification Tests
  - CD-Router
  - Wi-Fi
- Stability and Endurance Tests
  - Router Stress Test (96 hours)