
Product: RTL8196D/RTL8197D/RTL8196E 11n Firmware
Version: 3.2.3
Date: Dec 21, 2012

Description:

Realtek provides the turnkey solution for 11n Router/AP in hardware and software. The firmware could be adopted in Realtek EV (evaluation) board, or platforms designed according to Realtek reference circuit.

The current release firmware has only supported for router package. Will add AP package support in the future.

The following sections will describe the hardware requirements, firmware features, to-do list, and the release history.

Hardware Supported:

Realtek 11n FE Router/AP EV board:

- RTL8196D – SoC, including a CPU, Ethernet switch controller, single PCIe interface, and single USB 2.0 OTG interface
- RTL8197D – SoC, including a CPU, Ethernet switch controller, dual PCIe interface, two USB 2.0 interface(one OTG + one host controller)
- RTL8196E – SoC, including a CPU, Ethernet switch controller, single PCIe interface, and single USB 2.0 OTG interface
- RTL8196EU(Universal Linker) – SoC, including a CPU, Ethernet switch controller, single PCIe interface, and single USB 2.0 OTG interface
- RTL8192CE/RTL8192D – 802.11 a/b/g/n 2x2 MAC/BB/RF controller
- RTL8188E – 802.11 a/b/g/n 1x1 MAC/BB/RF controller
- RTL8192E – 802.11 a/b/g/n 2x2 MAC/BB/RF controller
- DDR2 –32M bytes/64M bytes (note1)(note2)
- SPI Flash –4M bytes/8M bytes (note3)(note4)
- SDRAM –32M bytes (note5)

Note1: 32M bytes(16bits) DDR2 for 8196D/8196E EV board, 64M bytes(16bits) DDR2 for 8197D

Note2: could support Samsung, Nanya, Promos, ISSI and Elpida.

Note3: 4M bytes SPI flash for 8196D/8196E EV board, 8Mbytes SPI flash for 8197D EV board

Note4:SPI flash could support for:

MX25L1605D, MX25L3205D, MX25L6405D, MX25L12805D, MX25L1635D, MX25L3235D, MX25L6445E , MX25L12845E , S25FL016A, S25FL032A, S25FL064P, EN25F16, EN25F32, EN25Q16, EN25Q32, SST25VF032B, GD25Q16, GD25Q32, W25Q16, W25Q32, W25X32 , W25X64 , AT25DF161

Note5:96E+88E EV board using 32M SDRAM

Hardware limitation:

- none

Firmware Features Supported:

- 802.11 a/b/g/n Access Point, WiFi compliant
- 802.1x, WEP, WPA TKIP and WPA2 AES/Mixed mode for PSK and TLS (Radius)
- Wireless Auto-channel selection
- WMM and WMM-APSD supported
- WDS supported with WEP, TKIP and AES encryption
- WPS(1.0/2.0) supported in AP and client mode
- IAPP supported
- 802.11 a/b/g/n client mode
 - Support infrastructure mode and ad-hoc mode with roaming capability
 - Support wireless security for WEP, WPA TKIP and WPA2 AES PSK
 - Support MAC Clone (single Ether device) and NAT2.5 (Multiple Ether clients)
 - Support site survey scan and manual connect
 - Support WPA/WPA2 PSK client
 - Support 802.1X
 - Wireless ISP supported (set wireless interface on WAN interface)
- Support universal repeater mode
- Wireless access control by MAC address (deny or accept)
- Support multiple SSID and guest access (note 1)
- 5G /2.4G con-current/selective mode support
- External LNA and high power PA support
- DFS support for 5G band
- Antenna diversity support
- 802.1d with spanning tree protocol
- TCP/UDP/ICMP/ARP protocol stack
- NAT/NAPT. ALG for: FTP, NetMeeting, SIP, VPN pass-through with multiple sessions (IPSEC, L2TP, PPTP)
- Firewall
- Virtual DMZ
- DHCP client and server
- PPPoE
- PPTP client
- L2TP client
- Boa web server
- DNS relay
- UPnP IGD
- VPN gateway and NAT traversal
- IPV6/PPPOE pass through support
- DDNS
- NTP client and daylight saving supported
- URL Filtering and DoS (Deny of Service)
- QoS supported by IP or MAC address
- Routing support for RIP1, RIP2 and static route
- System log
- IGMP proxy(v2/v3) and snooping
- MLD snooping support
- Support 802.1Q VLAN for Ethernet and wireless
- WAPI support

- SAMBA support
- DLNA support
- USB 3G module support
- Hostapd support
- HTTP file server support
- FTP server support

Note1: It could support up to 5 AP SSID (including primary) in the same time. Each virtual SSID could be configured with different security, WMM, data rate, band and port access (LAN or WAN). When using multiple SSID, the MAC address of each AP must be pre-configured with a unique address.

Boot Code Features Supported:

- Support TFTP upload
- Support SPI flash
- Support LZMA compression
- Support Debug Command

Release History:

Gateway/AP firmware v3.2.3 –Dec 21, 2012 **

- Wireless LAN driver changes as:
 - Add 92ER support
 - Fix 88ER IOT issue
 - Fine tune performance and stability for 88ER
 - Fix WDS data forwarding issue in WEP encryption for 88ER
 - Add Tx Power Limit support for 92C and 88C
 - Modify wlan PCIe setting to avoid spur issue
 - Fix repeater mode connection issue when channel bandwidth is different between remote AP and root AP
 - Fix the bug that it may switch channel between DFS and non-DFS channel repeatedly when auto channel and DFS channel are enabled simultaneously.
 - Fix IOT issue with Sony PSP game console
 - Modify driver to allow do WPS function in vxd interface of repeater mode
 - Fix 2.4G bad performance issue when 92D is used as 1x1 concurrent mode. This issue is induced in 3.2.2.1 release
 - Add a new feature to limit maximum Tx/Rx throughput by wlan interface (ie, root AP and virtual AP).
 - Fix a bug that 802.1x authentication may fail when switching dual-band concurrent to single band.
 - Fix a 88ER client mode bug that it may cause disconnection when doing group key rekey under WPA/WPA2.
 - Fix IOT issue with Intel 6205 in TKIP encryption
- Ulinker changes as:
 - Fix BT download hang issue
 - Fix mac clone issue under router mode
 - Fix 802.1x packet forwarding issue between USB and Ethernet

- Wireless LAN MP image changes as:
 - Add 8M MP image support for 96E
- Fix memory leak issue in firmware upgrade of web server when image is corrupted
- Fix the problem that Ethernet switch may not be re-initialized successfully when ESD attack
- Fix the issue when mib table size is defined over 255.
- Fix the issue that it may show “IP fragment” error while doing SONY PS3 “network connected test”.
- Fix ethernet link up or link down will cause the IPv6 multicast streaming traffic stop for 0.15s~0.2s
- Fix boa IOT issue with chrome browser
- Fix win7 sometimes can not access samba
- Fix the Ethernet will send out 802.3x pause frame in Chariot WLAN to LAN bi-directional test

**** Boot code v3.2.3 – Dec 21, 2012 ****

- Refine DDR2 32MB/64MB/128MB DTR parameter for 8196D/8197D
- Support for Micro spi flash
- add reset button support for 8196es platform
- 96E/96EU/96ES/96D/97D boot code version has been updated to "v0.6"

Gateway/AP firmware v3.2.2.1 –Oct 05, 2012 **

- Wireless LAN driver changes as:
 - Fine tune PCIe PHY parameter to fix the issue that wifi module can't bring up in some AP/router boards (induced from v3.2.2)
 - Fix bug of WDS WEP setting issue (induced from v3.2.1)
 - Fine tune 8188E power tracking mechanism
 - Fix bug of smart repeater mode (induced from v3.2.2)
- Fix the issue that device will send out pause frame when receiving heavy loading multicast streaming at start up
- Fix some USB IOT issue on OTG interface

Gateway/AP firmware v3.2.2 –Sep 18, 2012 **

- Wireless LAN driver changes as:
 - Fix 20/40 MHz coexistence not working on 8188E;
 - Fix 8188E IOT issue with LG smart phone (LTE2);
 - Fix client mode unnecessarily reconnection when STA channel width of HT information in AP's beacon changed frequently;
 - Fix 5G channel list without DFS in NCC domain;
 - Fix the issue that broadcast packet may be discarded by wifi client during group key rekey;
 - Fix client mode DHCP getting/forwarding issue;
 - Fix sequence number check error when receiving QoS and non-QoS data packets simultaneously;
 - Refine auto channel selection mechanism;
 - Add two regulation domain for global (14) and world-wide (15);
 - Add 96D pcie auto scan clock mechanism;
 - Improve 8188E throughput with Intel new driver (v15.1.1.1);
 - Support 2-path TX for 1ss-MCS, OFDM and CCK rates;

- Ulinker changes as:
 - Fix ulinker MAC OSX capability issue;
 - Fix ulinker can't be found after stop it in the device manager issue;
 - Refine domain name query, in previous, if ulinker's OP_MODE is BRIDGE_MODE, when ulinker can't get IP, ulinker will redirect every web query to DUT itself; Now, ulinker will not redirect url to DUT, when url doesn't match ulinker's domain name;
 - Refine autorun_img_tool , to prevent copy redundant files (.svn) to autorun.img;
 - Add ulinker customization support for change PID/VID/Device name in the menuconfig;
 - Add WISP repeater in ulinker manual mode;
- Wireless LAN MP image changes as:
 - Fix 92C bad EVM of wrong setting issue;
 - Fix 88E frequency bias issue;
 - Improve 88E OFDM EVM test but reduce 1dBm with original gain setting;
- Fix eth1 and wlan low performance on bridge mode;
- Fix 8196E link down and up with some NIC adapters;
- Fix heavy multicast packets is bursted into the DUT's Ethernet port cause the Ethernet port send out 802.3x pause frame when DUT power on;
- Fix that icmpv6 NS/RA packet can't bridge when ipv6 passthrough is enabled;
- Fix mibCounter and ifconfig display issue;
- Fix DHCP+PPTP/L2TP manual mode fail issue;
- Fix for wireless can't associate DUT when DUT is set to bridge mode and DUT LAN is set to DHCP client mode;
- Add new firmware upgrade mechanism;
- Add USB OTG resume/suspend support.

**** Boot code v3.2.2 – Sep 18, 2012 ****

- Add security files support
- 96E/96EU/96ES/96D/97D boot code version has been updated to "v0.5"

Gateway/AP firmware v3.2.1 –May 31, 2012 **

- Wireless LAN driver changes as:
 - Bug fixed for WPS fail when concurrent run two WPS daemons under the environment that dual band and one side is AP mode, the other side is client mode
 - WPS daemon version string has upgraded to “v2.11”
 - Add 8196E PCIE bus frequency autoscan
 - Fix smart repeater connection issue when 2nd side band differs with target AP in 40M mode
 - Fix smart repeater mode vxd-client connection issue with hidden AP
 - Fix auto channel selection under smart repeater mode
 - Fine tune performance of pure WDS
 - Fix wrong RTS rate under B sta + G sta + N sta mixed connection
 - Enable NAT25 and Mac Addr Clone feature concurrent
 - Modify setting to fix crypto engine unstable issue in some hardware board
 - Fix some setting error for 92D
 - Refine 8188E Tx Power Tracking function
 - Improve performance for 88E
 - Improve performance via multiple wifi clients
 - Add multiple profile support in wlan client and repeater mode.
 - Wifi logo patch for 92D 1x1 concurrent mode

- Ulinker changes as:
 - Improve usb ethernet performance.
 - Blink system led while system boot or change mode.
 - Refine auto mode detection: add repeater case.
 - Refine usb ethernet/storage switch algorithm.
 - Add Win8 support
- Wireless LAN MP image changes as:
 - Fix MP wrong setting when change bandwidth for 88E
 - Fix MP single tone not able to stop issue
 - Fix MP power tracking for 88E
 - Update Tx gain table to get better output power linearity
- Enhance USB IOT
- Improve software nat pppoe performance
- Fix skb leak when ifconfig down all eth interface
- Fix usb gadget compile error
- Fix sprintf log_info oversize when enable url filter
- Patch for dhcp client can't receive broadcast ack before lease time
- Fix dhcp client use 0.0.0.0 to rebind ip.
- Fix dhcp server allocate ip issues
- Fix SmartBits half duplex backpressure IOT issue.
- Refine flash tool to write uncompressed HW setting
- Fix forwarding multicast packets twice when enable rtk bridge vlan feature
- Refine rtk vlan tx flow to avoid OOM in some cases
- Fix dns proxy process Ipv6 'AAAA' query issue
- Refine fastpath for better compatibility with some abroad ISP
- Support to config pptp/l2tp server by domain name or ip
- Fix http file server can not download ntfs files
- Fix http file server can not show or download files with size equal or more than 4GB
- Fix http file server can not remove files with size equal or more than 2GB
- Fix http file server can not access unicode dir with IE
- Refine pppoe disconnect flow
- Enable Bridge/NAT support in default for VLAN configuration
- Send GARP when dhcp client get ip address or wan port is link up
- Disable always-host feature when domain name query is enable
- Patch for DNS tcp port 53 transaction id issue

**** Boot code v3.2.1 – May 31, 2012 ****

- Fix SmartBits half duplex backpressure IOT issue
- Add GigaDevice SPI support
- Update MXIC and Winbond SPI Flash clock parameter to follow spec
- Add 8196ES support
- Add reset button support and speedup booting sequence
- Fixed internal SWR issue to enhance PCI-E stability on 96D/97D platform
- Add SDRAM 8M/64M support
- 96C/96CT/98/98T boot code version has been updated to "v1.2"
- 96E/96EU/96ES/96D/97D boot code version has been updated to "v0.4"

Gateway/AP firmware v3.2 –Feb,29 2012 **

- Wireless LAN driver changes as:
 - Add RTL8188E support
 - Improve throughput under weak signal and noisy condition
 - Improve throughput in some 5G channels
 - Fix bug of sending CTS_TO_SELF
 - Fix some connection issues of client mode
 - Refine performance for RTL8192D high power board
 - Add smart repeater mode
 - Fix some bug of WPS IE contents
 - Improve station expiring mechanism
 - Improve throughput for Galaxy with BenchBee app
 - Improve the accuracy of power tracking for high power board
 - Modify WPS to support WPS spec 2.02 for brute PIN attack.
- Wireless LAN MP image changes as:
 - Improve the accuracy of power tracking for high power board
- Enhance system stability
- Refine DDR and SDRAM parameters for system stability in bootcode
- Add universal linker(96EU) Support
- Bug Fix for Switch Port 0 not stable sometimes
- Add regular expression function for DNS to select an interface
- Bug Fix for 97D high power with 8211DS Throughput no balance
- Bug Fix for RTL8139 nic link slow issue
- Reserve multicast address and do m2u for MDNS packets

**** Boot code v3.2 –Feb,29 2012 ****

- Refine Memory parameter for 96E

Gateway/AP firmware v3.1 – Jan 16, 2012 **

- Wireless LAN driver changes as:
 - Fix win7 wzc can't do WPS success when set AP band to n only.
 - Refine dual band performance
 - Fix dual band client connection issue with 2.4G AP
 - Fix dual band client mode issue with "b" only AP
 - Fix client mode IOT issues
 - Fine tune client mode performance
 - Fix NDSi connection issue with dual band AP
 - Fix ethernet lan pc get DHCP renew failure when DUT is at client mode and as DHCP client
 - Refine Auto Channel Selection
 - Fix wapi can not use N rate, and wapi client mode sometimes connect to AP failure.
 - Fix some wifi logo issues of new test plan
 - Add brute force attack mitigation for WPS
 - Fix repeater mode some connection failed issue
 - Refine repeater mode performance
 - Add region domains for CN and Russia
 - Fix bugs of some functions in MP mode
- Enhance system stability
- Bug fix for IPv6 ready LOGO phase 2
- Add 96E Support
- Add 97D+92CE+92D Demo-Board high power support

- Fix nf_conntrack number may exceed nf_conntrack_max in bt stress test, and decrease drop conntrack overhead
- Refine rtk vlan, and add rtk vlan wan<-->lan bridge feature
- Fix airplay disconnect issue
- Bug fix pocket AP domain name query failure in some cases
- Fix lan pc/sta can not access internet when wan mac clone wlan sta mac address.
- Bug fix for web UI will redirect to lan ip when access web from wan side
- Bug fix adding default route failure when lan ip and wan dhcp server ip address is the same
- Fix boa IOT issues with opera/firefox/chrome browser
- Add switch core debug tool command
- Forbid sta under virtual ssid to access AP webpage when access
- Fix l2tp low throughput when l2tp server behind a NAT devices
- Refine redirect IP when LAN/WAN IP conflict
- Avoid CPU utilization high when plug/un-plug lan cable under dhcp wan type
- Improve samba NTFS write performance

**** Boot code v3.1 – Jan 16, 2012 ****

- Add 8196E support

**** Gateway/AP firmware v3.0 – Sep 29, 2011 ****

First Release

**** Boot code v3.0 – Sep 29, 2011 ****

First Release