

Modified Linux Wireless Stack (mac80211)

The Product Description

The Product is a standard Linux wireless stack and a user-level utility with new added functions:

- a new type of wireless interfaces with collisionless time division media access (TDMA4WiFi *);
- a set of features for a unique spectrum efficiency (center channel frequency shifting, non-standard channel widths);
- a transparent high speed frame compression for all modes.

The modified wireless stack can be used in a variety of wireless-related and Linux-based software and hardware like routers, access points, repeaters, etc.

The Product can be useful for wireless carriers, hardware vendors and software developers.

Architecture and Key Components

The Product source code is based on the compat-wireless package and provides a trouble-free assembly for various Linux kernel versions.

In the binary form, the Product is a set of kernel modules (with two new additional modules) and one userspace utility (iw).

The Product can be delivered in the binary form as a set of pre-compiled modules for a specific kernel version and CPU architecture modules and userspace utility or as a source code.

In the latter case, the deliverable form includes:

- compat-wireless source code under GPLv2 license;
- patch set for compat-wireless package under GPLv2 license;
- source code for kernel module under dual GPLv2/BSD license (this module is a proprietary module broker);
- proprietary module source code; and
- patch set for the iw utility under GPLv2 license.

The modified wireless stack is absolutely backward compatible with the non-modified stack. It is compatible with other wireless solutions, which are compatible with standard Linux wireless stack.

The LZO compression is used for the transparent frame compression.

The Product is tested for x86, MIPS and ARM CPUs. The TDMA interface mode is available for Atheros / Qualcomm Atheros and Realtek wireless hardware.

Key Features

The Product implements the time division multiply access (TDMA) for ordinary 802.11abgnc hardware as a new type of interface.

The TDMA implementation is 'fair' and operates with fixed length time slot sizes. It has two independent coordination functions:

- the first function is suitable for the infrastructure mode (with Basestation and CPEs);
- the second function is suitable for mesh-networking.

Jumbo wireless frames and frame aggregation (A-MSDU) are used in the TDMA mode for all hardware.

Two different acknowledgment methods are implemented:

- individual acknowledgments suitable for high noisy environments; and
- group (bulk) acknowledgments providing maximal throughput and suitable for long distance links.

The Product provides instruments for efficiency spectrum management in any modes:

- channel widths in 2.5, 5, 10, 20, 40 and 80MHz are available (hardware dependable);
- channel center frequency shifting with 1MHz step.

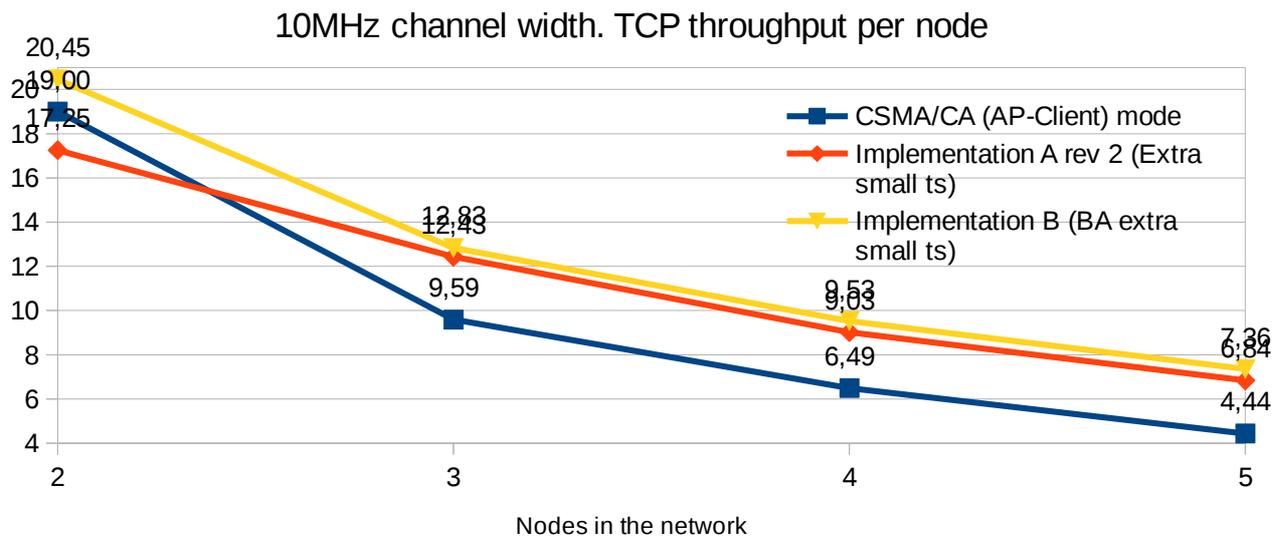
A Product-based solution can increase the throughput of existing wireless links by means of transparent frame compression (from several percent to several times) and/or by way of using TDMA modes instead of standard modes.

The Product provides the opportunity to have several different wireless interfaces for one hardware simultaneously.

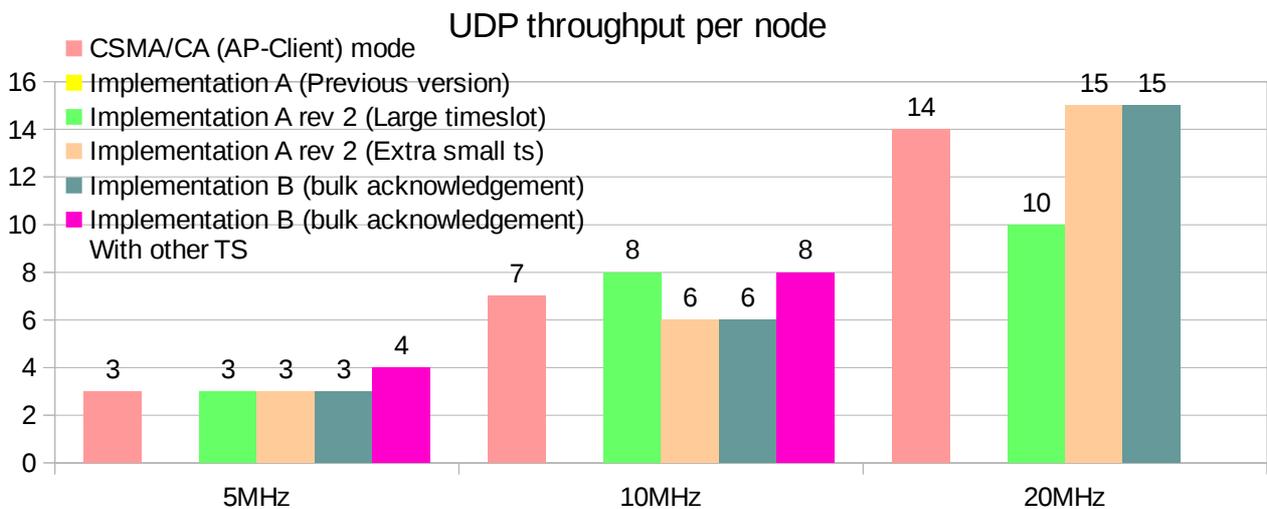
Key Benefits

The Product's spectral efficiency exceeds 2 bits per Hz per stream being inversely proportional to the channel width.

The Product provides maximum flexibility for spectrum management and has a better scalability and predicable latency / jitter in TDMA mode.



In most cases, the Product provides a better throughput in real environment. The TDMA mode provides the best throughput for 802.11abg hardware.



The Product-based solutions can be used for a variety of network topologies: point-to-point, point-to-multipoint, mesh.

Use Cases

The typical use cases for a point-to-point topology are carriers backhaul and distribution level:

- telephone E1 streams delivery (TDMoIP) through TDMA channels with 2.5 and 5MHz widths.
- long distance links (tens of kilometers).

- links in a very noisy environment.

The typical use case for a point-to-multipoint topology is the replacement of a CSMA/CA solution in a carrier access level with a collisionless TDMA solution to increase quality and/or network throughput.

Software upgrade for links using old hardware (802.11abg) is another important use case.

Specifications

The Product requires hardware with x86/MIPS/ARM CPU, at least 32MB of RAM and 4MB of flash (or other storage type) and Atheros, Qualcomm Atheros or Realtek wireless hardware.

The Product requires a cross compilation toolchain to build software from source codes.

* - *Separate document / description is available.*