



WILI-S is a quickest time-to-market modular, easily customizable networking software platform in the industry. WILI-S real world carrier grade reliability was proven by using it on thousands of devices in telecommunication operator networks. WILI-S opens new horizons for our customers with a quick and simple three step device customization process which makes it possible to deliver re-branded and customized networking device supported by our professional technically competent staff in a matter of days. No more expensive in-house development, firmware building and testing. WILI-S is available on a broad range of embedded hardware.

### 3 STEP PROCESS FIRMWARE BUILDING PROCESS

1. Customize and re-brand GUI (2 – 3 days)
2. Define default configuration file for a specific device role (1 – 2 days)
3. Assemble your own firmware image online in WILI FACTORY\* (10 minutes)

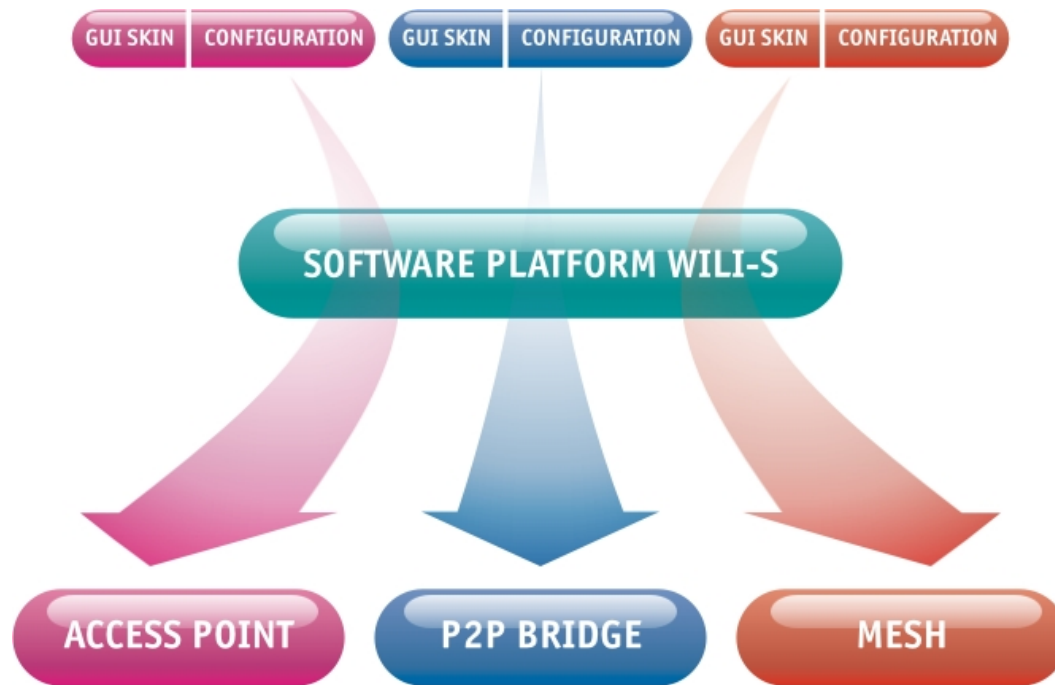
\* (available in Q2 2007)

### Benefits to network operators and enterprises:

Customized equipment exactly fitting requirements and out of the factory preconfigured for particular network settings and network environment.

### Benefits to hardware manufacturers:

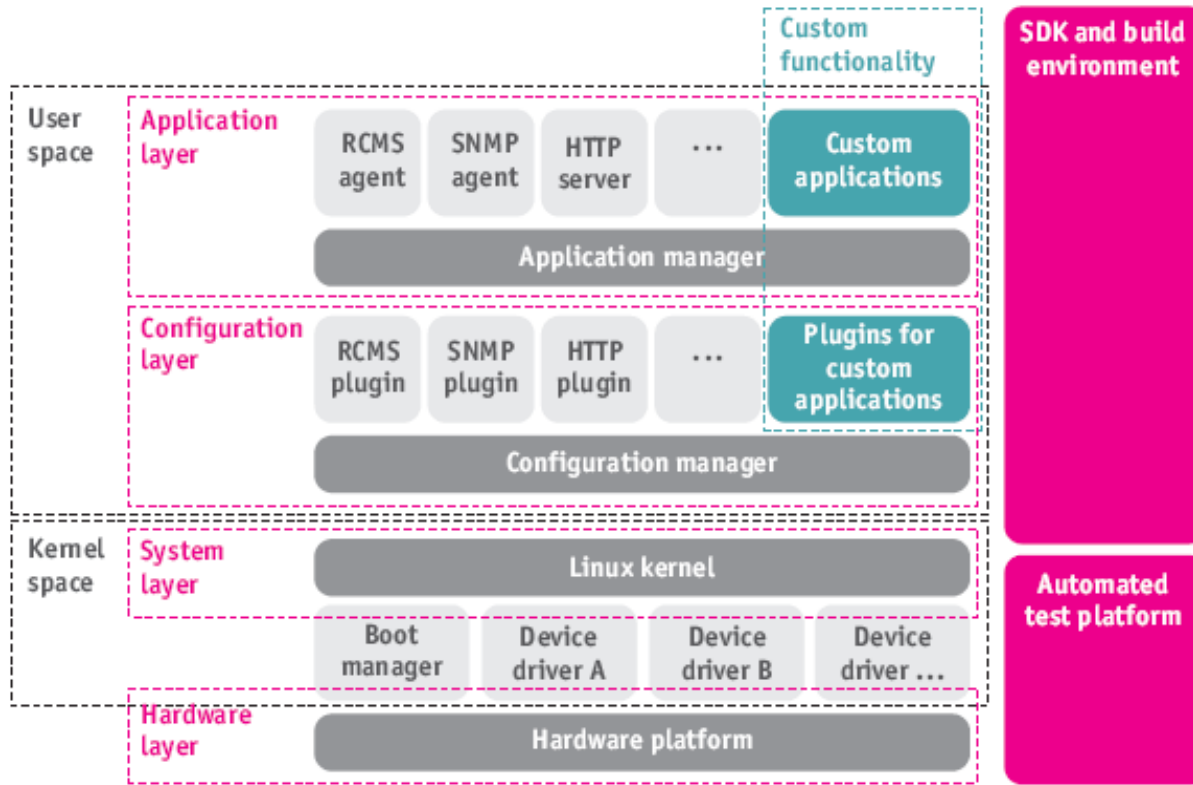
Quick time to market of fully branded customized device, 2 days for a working prototype, no need for expensive and time consuming in-house firmware building.



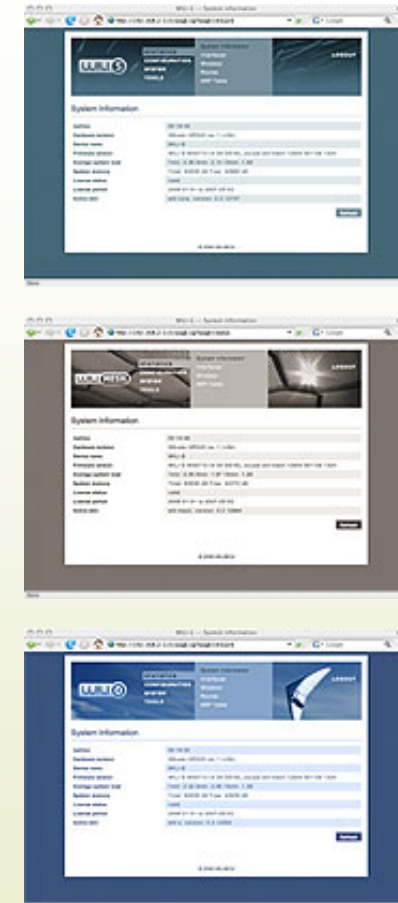


## SYSTEM ARCHITECTURE

WILI-S is based on modular design and it is easy to extend system functionality by adding new modules. Current WILI-S version 5.0 has a Linux kernel v 2.6.18.



Use WILI SKINS to change WILI-S functionality and interface appearance:



## GUI SKIN MECHANISM

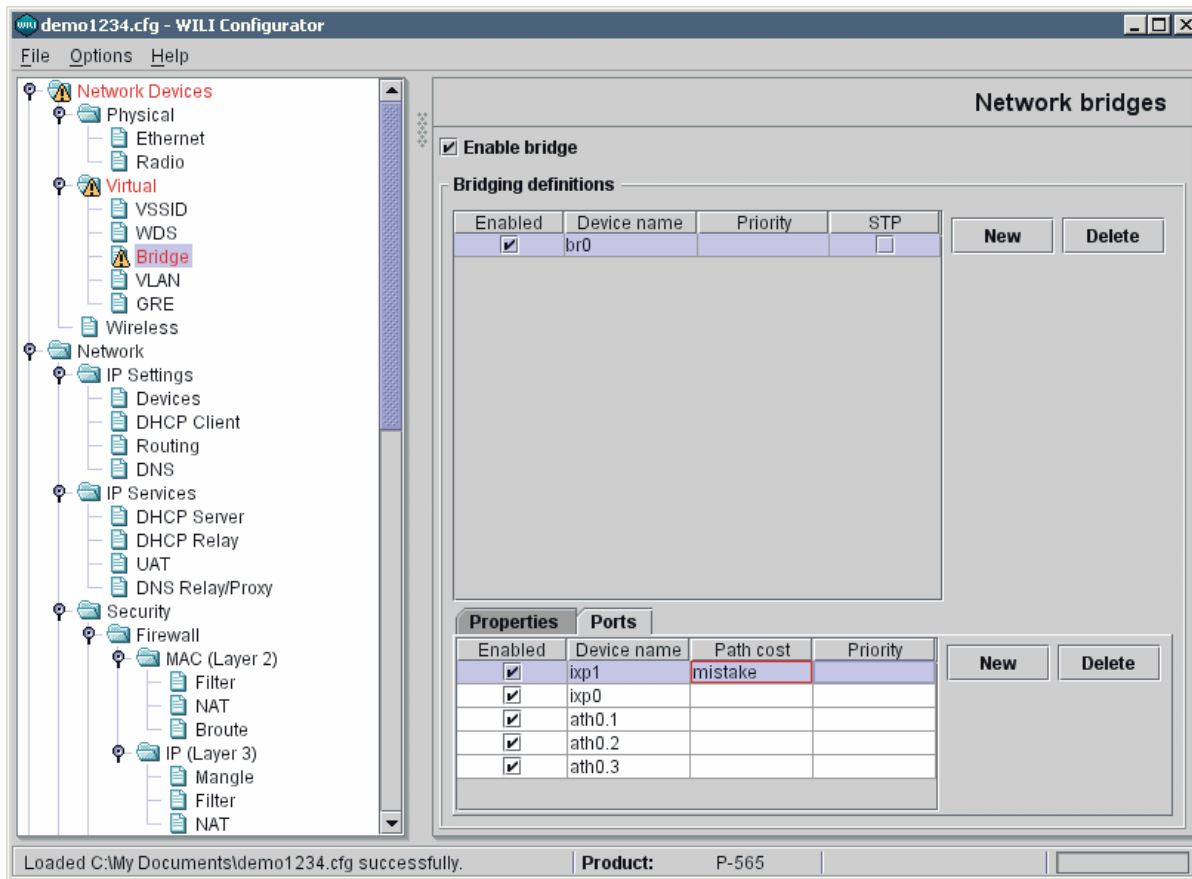
WILI SKIN concept is a unique GUI approach for WILI-S based devices. It allows you to have visually and functionally different web user interfaces on WILI-S devices. We call them WILI SKINS, but don't get caught on that - usually skins only change the look of the user interface; in our case they include graphics and program code. WILI SKINS direct attention to a subset of broad WILI-S functionality that is specific to a current device role. They are written in a popular PHP programming language and available for download from the WILIBOX website.



## WILI CONFIGURATOR

WILI Configurator is a standalone JAVA application and is supposed to be run on administrator desktops. This way it is possible to create device configurations without having physical devices turned on. JAVA solution enables running WILI Configurator on the most popular Operating Systems with JAVA support (Microsoft Windows, Linux, Solaris etc.). WILI Configurator is available as a free download for registered WILI users.

WILI Configurator aims at making the configuration generation as easy as it is possible by automatically filling up defaults for the most of newly created entries and highlighting possible syntactic value errors.



## Supported CPU's and CPU families

WILI-S is highly portable and is being used by our customers on numerous different hardware platforms. Under request WILIBOX can provide porting and customization services for a broader range of hardware:

Atheros SoC - AR2312, AR2315, AR2316, AR2317, AR2318, AR5312

MIPS - ADM5120

ARM-9 - Micrel KS8695P, Star STR910x

XScale – Intel IXP42x, IXP46x

PowerPC – Freescale, AMCC

I32 – AMD Geode SC1100, RDC3210, RDC3211, Intel



## Functionality summary

### Supported Standards

- IEEE 802.11a/b/g
- IEEE 802.11i
- IEEE 802.11d - Country element support
- IEEE 802.11e - Enhancements: QoS, including packet bursting (WMM)
- IEEE 802.11h - 5 GHz spectrum,
- DCS/DFS, TPC
- IEEE 802.11j - Country element support

### Wireless functionality

- Wireless MESH with Virtual AP (MBSSID)
- Multiple wireless interfaces
- Per virtual AP (MBSSID) wireless security settings
- Association limitation per Virtual AP (MBSSID)
- Automated channel selection
- Antenna diversity control
- Output power control
- Wireless distribution system (WDS)
- Open client mode
- Secure client mode with WEP, WPA, WPA2 PSK and enterprise (dynamic key) with 802.1x supplicant
- Half and quarter rate channels support
- FCC security band support

### Wireless Security

- WPA/WPA2 personal and enterprise (with dynamic key from remote RADIUS server) TKIP, AES (CCMP)
- Secure WDS mode, WDS inter access point traffic is secured by WPA/WPA2 in personal or enterprise modes
- Static and dynamic WEP
- 802.1x with EAP-MD5, EAP-TLS, EAP-PEAP, EAP-TTLS, EAP-SIM, EAP-LEAP
- Layer 2 intra and inter access point client isolation
- SSID broadcasting suppression

- Static wireless Access Control List, MAC address filtering

### Networking

- VLAN tagging, up to 4096 VLAN tags
- VLAN pass-through
- Bridging, spanning tree protocol (STP)
- IP routing
- DHCP server, client, relay
- DNS relay/proxy
- NTP and internal clock support
- Per VLAN, Virtual AP (MBSSID), IP tunnel or physical interface networking settings
- 802.1x authenticator
- 802.1x supplicant
- MAC filtering per interface
- IP filtering per interface
- Stateful inspection firewall
- Digital certificates for device identification
- IPSec with static keys and dynamic re-keying, hardware acceleration for IXP-42x platform
- Multiple GRE tunnels
- NAT/NAPT/ IP masquerading per interface and VLAN/Virtual AP (MBSSID)
- Diffserv with 802.1p mapping for WMM queues

### Public Access

- WEB login redirection (captive portal)
- PAP/CHAP/MSCHAP/MSCHAPv2)
- SMTP redirection
- Static and dynamic white and black lists
- RADIUS client has support for multiple authentication and accounting RADIUS servers
- RADIUS accounting client supports fail over and backup modes
- RADIUS authentication client supports fail over mode

- Per virtual AP (MBSSID) RADIUS, DHCP and NAT configuration
- WISPr RADIUS attributes support with per user dynamic bandwidth management
- Client IP connection logging to remote SYSLOG server.

### Management

- WEB management via HTTPS
- Command line management via SSH and serial console
- Configuration file upload via HTTPS and FTP
- RCMS configuration, firmware management and status reporting agent with NAT/Firewall traversal functionality
- Subnet or VLAN for management traffic
- Management access control list
- Administrator authentication via RADIUS or TACACS
- SNMP V1/2/3
- SNMP Traps
- Supported MIB's: 802.11, 802.1x, MIBII, RADIUS authentication, RADIUS accounting
- SYSLOG support including remote servers and debug levels
- Dual firmware images and TFTP firmware recovery from boot loader if both firmware images were damaged

### Operating System and Development Environment

- Linux kernel 2.6.18 XScale, ARM9, MIPS, IA-32
- uClibc
- Busybox utility set
- Supported file systems JFFS2, Cramfs, Squashfs
- Open source development tools GNU compiler collection (GCC), GNU Make



## Supported hardware platforms

Vendor	Model	CPU	miniPCI or built in radio	LAN ports	Serial port	USB	FLASH MB	RAM MB	Manufacturer WEB site
Lanready	FN5-22PF	IXP420/266MHz	2	2	RS232	-	8	32	<a href="http://www.lanready.com">www.lanready.com</a>
Lanready	WDR800	IXP425/533MHz	4	2	RS232	-	16	64	<a href="http://www.lanready.com">www.lanready.com</a>
Lanready	FN2A2	AR2317	11g built in	2	RS232	-	4/8	16/32	<a href="http://www.lanready.com">www.lanready.com</a>
Lanready	FN112	RDC3210	1	2	RS232	USB H	8	16/32	<a href="http://www.lanready.com">www.lanready.com</a>
Wistron	RDA81	AR5312	11ag built in	3	-	-	4	32	<a href="http://www.wnweb.com">www.wnweb.com</a>
Wistron	RDAT 81	AR2313	11 a+g built in	1	-	-	4	32	<a href="http://www.wnweb.com">www.wnweb.com</a>
Z-Com	XG 1020*	AR2318	N/A	1	-	-	4	16	<a href="http://www.zcom.com.tw">www.zcom.com.tw</a>
Z-Com	3121P*	IXP422/266MHz	2	2	-	-	8	32	<a href="http://www.zcom.com.tw">www.zcom.com.tw</a>
Z-Com	3621P*	IXP422/266MHz	1	1	-	-	8	32	<a href="http://www.zcom.com.tw">www.zcom.com.tw</a>
Senao	NOP8670	IXP425/533	2	2	RS232	-	16	64/128	<a href="http://www.senao.com.tw">www.senao.com.tw</a>
PCEngines	WRAP2E/1E	Geode SC1100	1/2	1/2/3	RS232	-	CF	64/128	<a href="http://www.pcengines.ch">www.pcengines.ch</a>
ADI eng.	Pronghorn Metro*	IXP425/533MHz	4	2	RS232	-	16	64	<a href="http://www.adiengineering.com">www.adiengineering.com</a>
ADI eng.	Pronghorn SBC*	IXP420/266MHz	1 or 2	2	RS232 opt	-	16	32/64	<a href="http://www.adiengineering.com">www.adiengineering.com</a>
Compex	WP54AG	ADM5120	1	2	-	-	4	16	<a href="http://www.compex.co.sg">www.compex.co.sg</a>
Zinwell	ZW4400/4200	IXP425/533Mhz	2/4	2	RS232	-	8	32	<a href="http://www.zintech.com.tw">www.zintech.com.tw</a>
Mikrotik	Routerboard 100*	ADM5120	0/2/3	1/5	RS232	-	64	16/32	<a href="http://www.mikrotik.lv">www.mikrotik.lv</a>
Magicbox	MAGICBOX 1/2 *	AMCC200/333MHz	1/3	1/2	RS232	-	4	32/64	<a href="http://www.magicbox.pl">www.magicbox.pl</a>
PePLink	Winti*	Micrel KS-8695P	1	1	-	-	8	32	<a href="http://www.pepwave.com">www.pepwave.com</a>
PePLink	Manga*	Micrel KS-8695P	2	5	RS232	USB H	8	32	<a href="http://www.pepwave.com">www.pepwave.com</a>
UBNT	Litestation2*	AR2316	11g built in	2	RS232	-	4	16	<a href="http://www.ubnt.com">www.ubnt.com</a>
UBNT	Litestation5*	AR2313	11a built in	1	-	-	4	16	<a href="http://www.ubnt.com">www.ubnt.com</a>
UBNT	AP-One*	AR5312	11 a+g built in	1	-	-	4	16	<a href="http://www.ubnt.com">www.ubnt.com</a>
Gateworks	Avila GW2348-4	IXP425/533MHz	4	2	RS232	USB H	16	64	<a href="http://www.gateworks.com">www.gateworks.com</a>
Gateworks	Avila GW2348-2	IXP420/266MHz	2	2	RS232	USB H	8	32	<a href="http://www.gateworks.com">www.gateworks.com</a>
Gateworks	Avila GW2347	IXP420/266MHz	1	1	RS232	-	8	32	<a href="http://www.gateworks.com">www.gateworks.com</a>
Gateworks	Avila GW2345*	IXP425/533MHz	4	5	RS232	-	16	64	<a href="http://www.gateworks.com">www.gateworks.com</a>
Gateworks	Avila GW2342	IXP425/533MHz	4	2	RS232	-	16	64	<a href="http://www.gateworks.com">www.gateworks.com</a>
Axiomtek	NA-814	Pentium M	1	4 (gbit)	RS232	USB H	CF	256	<a href="http://www.axiomtek.com">www.axiomtek.com</a>

\*on demand porting



## Design cross-reference

Vendor	Model	WILI-AP	WILI-O	WILI-MESH	WILI-AC	WILI-3G	WILI-MAX
Lanready	FN5-22PF	■	■	■			
Lanready	WDR800	■	■	■	■		
Lanready	FN2A2	■	■			■	
Lanready	FN112	■	■				■
Wistron	RDAA 81	■		■			
Wistron	RDAT 81	■	■				
Z-Com	XG 1020*	■					
Z-Com	3121P*	■	■	■	■		■
Z-Com	3621P*	■	■	■			
Senao	NOP8670	■	■	■	■		■
PCEngines	WRAP2E/1E	■	■	■			■
ADI eng.	Pronghorn Metro*	■	■	■			
ADI eng.	Pronghorn SBC*	■	■	■			■
Compex	WP54AG	■	■				
Zinwell	ZW4400/4200	■	■	■	■		
Mikrotik	Routerboard 100*	■	■	■			
Magicbox	MAGICBOX 1/2 *	■	■	■			
PePLink	Winti*	■	■				
PePLink	Manga*	■		■			
UBNT	Litestation2*	■	■				
UBNT	Litestation5*	■	■				
UBNT	AP-One*	■		■			
Gateworks	Avila GW2348-4	■		■		■	
Gateworks	Avila GW2348-2	■		■		■	
Gateworks	Avila GW2347	■	■				■
Gateworks	Avila GW2345*	■			■		
Gateworks	Avila GW2342	■		■			
Axiomtek	NA-814				■		

\*on demand porting