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BriLAN[™] NOS and BriLAN[™] NMS

embedded

Network Operating System (NOS) and Network Management System (NMS)

BriLAN[™] Network Operating System (NOS) is highly optimized 32-bits Network Operating System and application designed for 80x86 processor architecture, capable of running on standard PC hardware. The seven years of continuous development and improvements, its stability, scalability and high performance pre-defined **BriLAN[™]** as "the kernel of choice" for number of OEM technology partners of SoftHill. **BriLAN[™]** allows them to build highly efficient yet cost-effective devices to provide solutions for simultaneous data and voice connections – ranging from simple point-to-point to more complex Point –to-Multipoint networks.

Support for voice communication build in **BriLAN[™]** technology allows voice and data users to share bandwidth on a single network. Every call has an assigned dedicated voice channel, which is prioritized over the data channel, enabling **BriLAN[™]** to guarantee delivery of high quality voice communications.

BriLAN[™] based devices offer a combination of functionality previously only achievable by using several products from multiple producers and vendors. **BriLAN[™] NOS** supports following features:

- 💜 Bridging
- Standard IP Routing
- Advanced Traffic Shaping
- Packet Filtering
- Wireless Point-to-Point
- Wireless Point-to-Multipoint connections (in AP mode) in routing as well as bridging mode
- Wireless Access Point (for PC card as a client)
- Fixed Wireless and wired extension of the Analog phone lines
- Complete traffic statistics collection



BriLAN Versions

| | Bridging | Routing | Voice | Traffic Shaping | Synchronous interfaces | Access Point |
|----------------|----------|---------|-------|--------------------|------------------------|-----------------|
| BriLAN NOS SA | х | х | 0 | 0 | 0 | 0 |
| BriLAN NOS AP | х | Х | 0 | х | х | х |
| BriLAN NOS VOX | х | Х | Х | х | х | х |

- BriLAN[™] NOS SA Station Adapter –supports point-to-point connection and work as a part of Point-to-multipoint scenarion as a client station in connection with BriLAN PRO-AP
- **BriLAN[™] NOS AP** Access Point acting as a central station for Point –to- multipoint type of the wireless networks. Support ability to build network devices with above functions.
- **BriLAN[™] NOS VOX** Voice Supports functionalities as PRO-AP and SAwith additional support for extending analog phone lines over the wireless or wired network.

Scalability and Flexibility

BriLAN[™] NOS based devices can be designed as simple - two port - or complex - multiport devices to answer all customers needs. Any combination of up to 6 interfaces per device is supported. Variety of different Interfaces is supported (Ethernet, Wireless 802.11, X.21, V.35, G.703 and more)



BriLAN [™] NOS functions

Bridging

Ethernet wireless bridge suitable for LAN –to- LAN environments , interconnecting LANs from two different locations.

Features:

LAN bridging where all of the LAN interfaces present at the network are bridging among themselves according to IEEE 802.3

- transparent bridging
- o up to 2048 MAC addresses, stored in bridge table
- Level 2, store and forward
- Broadcast Storm Protection setup of the maximum number of packets per second broadcasting from the network device – protecting of the LAN against traffic overload
- Bridge Group Manager up to 7 logical groups per port (VLAN)

| Bridge Groups "ALFA" (158.195.40.85) | | | | | | | | | |
|--------------------------------------|--|---------|----------|----------|----------|----------|-------------|----------|--------------|
| Bridge Gr | Bridge Group assignment on port s1p1 [Eth] | | | | | | | | |
| | | Curreni | t Values | New | values | | | | |
| Bridge (| aroup O | Ena | bled | En | abled | | Enable Brid | lging | |
| Bridge (| aroup 1 | Disa | bled | Dis | abled | | | | |
| Bridge (| aroup 2 | Disa | bled | Dis | abled | | | | |
| Bridge (| Group 3 | Disa | bled | Dis | abled | | Sar | ve | |
| Bridge (| aroup 4 | Disa | bled | Disabled | | | Clo | . 1 | |
| - Bridae (| aroup 5 | Disa | bled | Disabled | | | »e | | |
| Bridge (| Group 6 | Disa | bled | Dis | abled | | | | |
| Bridge (| Group 7 | Disa | bled | Dis | abled | | | | |
| | | | | | | | | | |
| Port | Bridging | Group 0 | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 | Group 6 | Group |
| s1p1 [Eth] | Enabled | Enabled | Disabled | Disabled | Disabled | Disabled | Disabled | Disabled | Disable |
| s2p1 [Eth] | Enabled | Enabled | | | Disabled | | | | |
| s3p1 [Eth] | Enabled | Enabled | Disabled | Disabled | Disabled | Disabled | Disabled | Disabled | Disable |
| s4o1 (Eth) ◀ | Enabled | Enabled | Disabled | Disabled | Disabled | Disabled | Disabled | Disabled | Disable • |
| | | | | | | | | | |

Routing

Segregation of the networks on the network layer - LAN 1 to LAN xxx routing

- Level 3, static routing tables
- o up to 64 routing records (128 optional)
- Available for physical and logical interfaces

| Static IP routes "BriLAN" (12.12.12.12) | <u>_</u> _× | 🚔 Port IP addresses "BriLAN" (12.12.12.12) |
|--|---|--|
| Target Network | Add Delete | Select Port s1p1 [wLAN] Add Delete Port IP Address Subnet Mask Close |
| Metric 1 | | Port IP Address Subnet Mask Broadcast Encapsulation |
| Target Network Network Mask Gateway Address Port | Metric Status Encapsulation | s1p1 [wLAN] 11.11.11.12 255.255.0 11.11.11.255 Ethemet s2p1 [wLAN] 14.14.14.12 255.255.255.0 14.14.14.255 Ethemet |
| Logic retrieve Tester (Minus) Tester (Minus) Tester (Minus) 1313130 255255550 14141412 s2p1 1212120 255255550 12121212 s3p1 1111110 255255550 12121212 s3p1 1010100 255255550 12121212 s3p1 10101100 255255550 11.11.1112 s1p1 | O Active Ethernet Active Ethernet | s3p1 [Eth] 12.12.12.12 255.255.255.0 12.12.12.255 Ethemet |
| | 11. | |



Point-to-Point, Infrastructure Client

Infrastructure client – communication as a part of the Infrastructure based on the AP function **Point-to-Point** transmition providing connection between two points.

Access Point (Point-to-Multipoint connection)

Mainly **Point-to-Multipoint** transmition providing connection between several client stations as well as AP stations equipped with *wireless cards – communication type* **Infrastructure** mode. Supports communication for up to 128 clients from one central point (AP)

Bandwidth Management

Speed limit, and queue membership are customizable rules for the Traffic Shaping service of BriLAN based WISP AP, available in **Traffic Shaping Manager**.

BriLAN based device regulates packet transfer rate on ports or network nodes meeting the specific demands on the network throughput. Without limiting the packet transfer rate users can achieve traffic performance up to maximum speed of the wireless or Ethernet interface. Speed can limit data flow on a physical Port or logical group of Network Nodes.

Ports or Network Nodes can be defined by MAC or IP addresses in 128 independent Traffic Shaping Queues. Traffic queues with 512 Kb shared data buffer, working at user defined data speed limit, can be independently started or stopped.

Traffic shaping queues

128 queues Queue – speed limit

- predefined (from 32 Kbps up to 4096 Kbps)
- custom assignment

Assignment

- per physical port (up to 24 ports in one device)
- per IP address (up to 128 user definable records of IP hosts and/or network addresses)
- per MAC address (up to 2048 MAC addresses)

Other Features:

Queue Operation Status Active – running based on settings Inactive – keeps settings – queue in BYPASS mode Discard – settings in Active mode – data will be blocked (discarded) for user

Statistical information: Utilization of the queue Buffer usage Amount of data transferred, dropped (did not processed by queue – buffer overload)



Quality of Service (QoS)

3 priority queues – data prioritization (based on transmitted packets) (512 KB buffer, 256 packet entries per queue)

Assignment: Per port (installed Interface)

Statistical Information:

Current throughput Max. throughput Current amount of transmitted data Total amount of transmitted data

| Port Level QoS | a | 5 (8 (5.1) | _ 🗆 × |
|-------------------------------------|-----|---------------------|-------------------------------|
| High | | Medium | Low |
| Priority Queue | | Priority Queue | Priority Queue |
| Throughput [bps] | | Throughput [bps] | Throughput [bps] |
| Act 0 | | Act 122,082 | Act 96 |
| Avg 0 | 1 | Avg 106,403 🐔 | Avg 487 🕐 |
| Max 0 | 104 | Max 8,222,430 | Max 17,552 |
| Bytes Transferred | | Bytes Transferred | Bytes Transferred |
| Last 5 sec | 0 | Last 5 sec 76,301 | Last 5 sec 60 |
| Total | 0 | Total 5,357,581,361 | Total 24,528,932 |
| Buffer Usage [%] 0 | | Buffer Usage [%] 5 | Buffer Usage [%] 0 |
| | | | |
| Assigned Stop1 (W Ports Stop1 (W | | Assigned Ports | Assigned Ports s5p1 [WLAN] |
| 1 | | Adat his Abit | |

MAC address and IP address level Firewall

Protection against network access by unauthorized users. System Administrator can specify default port accessibility mask (permitted and/or denied ports) which will be applied to every new network user based on their MAC or IP address.

Device Time Synchronization

Synchronization of Device internal time with time of the Time Synchronization Master (TSM) – which is represented by management station running BriLAN NMS.

Automatic Synchronization – periodically synchronize time with *Manual TSM* – manual (one time) synch. with any station running BriLAN NMS.

| Device Time Synchronization Date and time of the BriLAN based devices should be synchronized with the management station running BriLAN NMS. There are two ways to keep your network devices synchronized: AUTOMATIC synchronization - The management station sends synchronization packet to the network, periodically in one hour intervals. In order to use this method - IP address of the management station running BriLAN NMS has to be predefined on the BriLAN device as "Time Synchronization Master". If no "Master" IP address is set, synchronization packets will not be | | | | | | |
|--|--------------------------------|--|--|--|--|--|
| accepted by BriLAN devices. MANUAL synchronization - One time synchronization of all BriLAN network devices. Date and time of all devices will be synchronized with the present management station running BriLAN NMS, even if it is not defined as "Time Synchronization Master". Current Time Dec 7, 2001 18:06:43 Set Cancel | | | | | | |
| Device Name | TimeSync Master | Current Device Time | Status | | | |
| ≪_G1 | 158.195.43.27 | Dec 8, 2001 03:02:50 | Synchronized to master | | | |
| ≪_G2 | 158.195.43.27 | Dec 8, 2001 03:02:49 | Synchronized to master | | | |
| ≪_G3 | 158.195.43.27 | Dec 8, 2001 03:02:51 | Synchronized to master | | | |
| ≪_B1 | 150 105 10 07 | D 0 0001 00 00 F0 | C 1 1 1 1 1 | | | |
| - BI | 158.195.43.27 | Dec 8, 2001 03:02:50 | Synchronized to master | | | |
| S B2-1 | 158.195.43.27 158.195.43.27 | Dec 8, 2001 03:02:50 Dec 8, 2001 03:02:50 | Synchronized to master Synchronized to master | | | |
| a". | | , | | | | |
| ≤B2-1 | 158.195.43.27 | Dec 8, 2001 03:02:50 | Synchronized to master | | | |
| ି B2-1 କ୍ଟିB2-2 | 158.195.43.27 158.195.43.27 | Dec 8, 2001 03:02:50 Dec 8, 2001 03:02:51 | Synchronized to master Synchronized to master | | | |



BriLAN[™] NMS

Management System – powerful tool for Network Administrators

BriLAN[™] NMS - **Network Management System** – Software application (Windows 32-bit) providing ability to manage **BriLAN[™]** based devices remotely over the TCP/IP network. Supports setup and monitoring of the devices with the ability to display information for data flow, status of the devices, event logging, and more. Setup allows user to set all important hardware and software parameters of the device.

All management data transmitted over the network are encrypted. Password protected access to the features of NMS provides users with highly secure way of managing it's networks.

Setting up of the BriLAN based devices:

Local setup

- Serial port - terminal type connection - with build in terminal functions in NMS

Remote setup and monitoring

- Ethernet port – TCP/IP based connection



BriLAN[™] NMS – Screen shots

Map of the BriLAN Devices - different color represents status of the Device



| 🧾 Expanded View | ٧ | | | | | | | |
|---|-------------------------|--------------------|------------------|----------------|-----------------|------------------|-----------------|---------|
| <u>D</u> evice <u>C</u> onfigure | <u>B</u> W Mana(| gement <u>U</u> se | ers <u>V</u> iew | <u>G</u> raph | | | | |
| CPU utilization Act | | CPU | Eth 10 Mbps | Eth 10 Meps | WLAN 1 Mbps | WLAN 5.5 Meps | WLAN 1 Mbps | |
| Avg IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | ar OK | | | Í | 0 | ٢ | • | |
| Bridging Ena Routing Disa | abled abled abled | CONSOLE | Act 🔿 Stat 🔿 | Act O Stat O | Act 🔿 Stat 🔿 | Act 🔿 Stat 🔿 | Act 🔿 Stat 🔿 | |
| SW 3.81 SN: 10 | 080002 | | ****** | | | | | |
| Port | Status | QoS | | Frames In | Fran | mes Out | By | tes In |
| s1p1 [Eth] | Clear | Medium | | 6,417,662 | 5,1 | 322,955 | 2,764,94 | 5,359 |
| s2p1 [Eth] | Clear | Medium | | 3,536,378 | 3,847,337 | | 2,018,05 | 1,803 |
| s3p1 [WLAN] | Clear | Medium | 305,567 | | 8 | 301,971 | 48,27 | 4,491 |
| s4p1 [WLAN] | Clear | H-M-L | 884,071 | | 824,738 | | 385,79 | 13,531 |
| s5p1 [WLAN] | Clear | H-M-L | | 656,306 | 1,7 | 196,902 | 53,30 | 1,892 |
| • | | | | | | | | ▶ |
| | | | | | | UpTime: | 4 d, 13:36 | :09 //. |

Graph - statistical data per physical port in the Device



Bandwidth Management - assignment of specific speed to a customer or to a device port



| 🧾 Expanded View | | | 05.0 | | | | | |
|----------------------------------|-----------------------|--------------------|-----------------|----------------|---------------|------------------|----------------|--------|
| <u>D</u> evice <u>C</u> onfigure | <u>B</u> W Manag | gement <u>U</u> se | rs <u>V</u> iew | <u>G</u> raph | | | | |
| CPU utilization [Act Avg | | CPU | Eth 10 Mbps | Eth 10 Mbps | WLAN 1Mbps | WLAN 5.5 Mbps | | |
| Bridging Ena | r OK bled ibled | CONSOLE | Act O | Act C | Act O | Act O | Act 🔿 | |
| SW 3.81 SN: 100 | 80002 | | | | | | | |
| Port | Status | QoS | | Frames In | Fra | mes Out | Byt | es In |
| s1p1 [Eth] | Clear | Medium | | 6,417,662 | 5, | 322,955 | 2,764,945 | 5,359 |
| s2p1 [Eth] | Clear | Medium | | 3,536,378 | - 7 | 847,337 | 2,018,051 | 7 |
| s3p1 [WLAN] | Clear | Medium | | 305,567 | | 801,971 | 48,274 | |
| s4p1 [WLAN] | Clear | H-M-L | | 884,071 | | 824,738 | 385,793 | · |
| s5p1 [WLAN] | Clear | H-M-L | | 656,306 | 1, | 196,902 | 53,301 | ,892 |
| • | | | | | | | | Þ |
| | | | | | | UpTim | e: 4 d, 13:36: | 09 //. |

Interfaces – display of installed interfaces in BriLAN based devices

For more and updated information on BriLAN technology please visit our web site at:

www.softhill.com , www.brilan.com

You can <u>download</u> fully functional BriLAN NMS together with database of IP addresses and see the performance of real network installation in the University of Technology, Bratislava, Slovak republic, Europe.



Supported Hardware

Motherboard, BIOS, CPU, Memory, Ports and Storage Media

- Motherboard: standard PC AT type or higher with the support for 32-bit OS
- BIOS: support for plug-and-play OS required
- CPU: Intel compatible (Intel, AMD) 386 or higher (depends on required performance) [min. 486, 100 MHz recommended]
- RAM: min. 6 MB
- **Boot media:** DiskOnChip, IDE Flash Disk, FDD or HDD to boot up the system with at least 1.4 MB. (*DiskOnChip min. 2 Mb recommended to avoid problems with mechanical parts FDD or HDD*)
- **Ports:** Serial port (RS 232) - used as console port for setting-up the device properties

BriLAN[™] NOS supported interfaces

| Туре | Manufacturer | Slot type | Media connector | More info |
|---------------------|----------------------|-----------|--------------------|--|
| 3C509 | 3COM www.3com.com | ISA | TP, BNC, AUI | 10 Mbps, the best performance ISA card |
| SMC8x16 | SMC www.smc.com | | TP, BNC, AUI | 10 Mbps, Ultra and EtherEZ models |
| NE2000 (RTL8139) | | PCI | TP | 10/100 Mbps, NE2000 compatible with RTL8139A(B) Ethernet controller |
| NE2000 | | ISA | TP, BNC, AUI | 10Mbps |

1. Ethernet and Fast Ethernet interfaces

2. Asynchronous interfaces

| Туре | Manufacturer | Slot type | More info |
|----------------------|--------------|-----------|-----------------------------|
| UART 16450, 16550 | | ISA | Serial asynchronous adapter |

3. Synchronous interfaces

| | Manufacturer | Slot type | More info |
|-----------|--------------|-----------|------------------------------|
| SuperSync | Moxa | ISA | Serial synchronous X.21/V.35 |
| C101 | www.moxa.com | | adapter, up to 5 Mbps, |



4. Wireless Ethernet interfaces

| Туре | Manufacturer | Slot type | More info |
|--|---|---------------|---|
| PC4500* PC4800* 340 Series and higher | Aironet/Cisco www.aironet.com www.cisco.com | ISA/PCI | 2.4 GHz DSSS 11 Mbps NIC |
| SWL-2100P | Samsung www.sem.samsung.com | PCI | 2.4 GHz DSSS 11 Mbps wireless adapter (MagicLan) |
| EUSSO | Eusso Technolgies www.eusso.com | PCMCIA | 11 Mbps 2.4 GHz DSSS |
| Raylink | Raylink Inc. www.raylink.com | PCMCIA ISA | 2.4 GHz FHSS 2 Mbps wireless adapters |
| WaveLAN Orinoco | Lucent www.lucent.com | ISA, PCI | 11 Mbps wireless adapter |

5. Voice support interfaces

| Туре | Manufacturer | Slot type | More info |
|----------------------|---|-----------|--|
| Internet LineJack | Quicknet Technologies www.quicknet.com | ISA | Adapter providing connection to extend the reach of analog phone lines |

