Product Brief

AR7 ADSL Network Support Package (NSP)

Texas Instruments' (TI) Network Support Package (NSP) is a Linux®-based router software stack for the AR7 customer premises ADSL reference designs, providing the network protocols, bridging, gateway, routing and management features needed to quickly and easily design feature-rich customer premises modems.

NSP includes optimizations to extract the maximum performance from a Linux based router solution. It includes an advanced QoS implementation which allows it to meet ADSL/ADSL2/ADSL2+ data rates. The optimizations include specific enhancements to ensure sustained high quality voice even under heavy data traffic. It is a robust software package with an optimized architecture easily configured for high volume deployments. In addition to the many standard Gateway Routing features it supports, the NSP can also be used in conjunction with TI Wireless 802.11 AP and Voice over IP software.

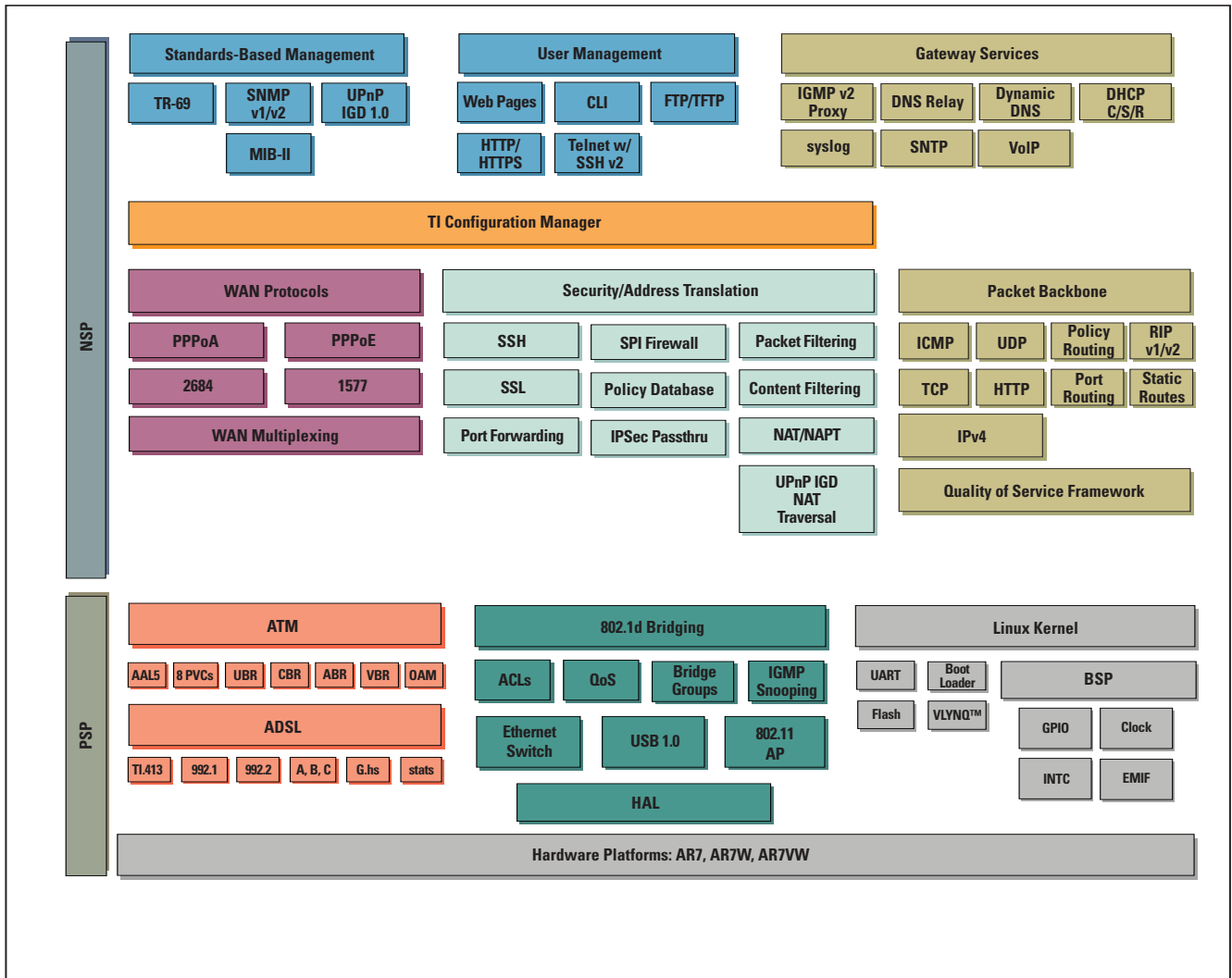Developed by TI, the NSP takes advantage of software core competencies to offer a field-proven and highly interoperable solution to modem manufacturers worldwide. Three different configurations are available from a base router solution up to a high-end VoIP Residential Gateway with 802.11b/g WLAN solution giving developers the right mix of features needed for their products.

The NSP recently added new functionality to the system. Inbound and outbound Quality of Service is now available that optimizes the CPU for the most important traffic. The infrastructure for DSL Forum's TR-069 is included in the release package so manufacturers can easily extend the management parameters and objects needed by Service Providers. AR7-powered solutions are stronger than ever.

TI's AR7 product line provides a complete ADSL router reference design solution, from the industry leading AR7 silicon, to field-proven reference designs, to a comprehensive software stack. The NSP runs on TI's Residential Gateway processors which share a common architecture with TI's other broadband products enabling manufacturers additional flexibility and design reuse, thus making it the perfect platform for the one-box home networking solution.

Key Features:
- Linux®-based router stack optimized for the AR7 platform enabling addition of functional blocks for increased system differentiation
- Included in AR7 Reference Design Package made up of the AR7 Evaluation Module, ADSL physical layer (PHY) firmware, device drivers, network processor drivers and network layer management software
- Seamless integration with TI VoIP offering an extensive voice CODEC family and field-proven VoIP solutions
- Seamless integration with TI Wireless 802.11 b/g Access Point
- Support for many basic Residential Gateway features including
  – Network Address Translation and SPI firewall,
  – Full range of protocols (PPPoA, PPPoE, RFC2684 and IPoA)
  – 802.1d bridging with bridge groups and IGMP snooping
  – Policy and port-based routing, RIP and static routes
  – Flexible QoS framework that blends Layer 2/3 QoS
  – Video ready functions like multicast IP and IGMP proxy/snooping
  – PVC multiplexing
- Unified management with support for user and standards-based management: Web pages, SNMP, CLI, DSL Forum TR-69
- Footprint and performance optimized

NSP

Standards-Based Management
- TR-69
- SNMP v1/v2
- UPnP IGD 1.0
- MIB-II

User Management
- Web Pages
- CLI
- FTP/TFTP
- HTTP/HTTPS
- Telnet w/ SSH v2

Gateway Services
- IGMP v2 Proxy
- DNS Relay
- Dynamic DNS
- DHCP C/S/R
- syslog
- SNTP
- VoIP

TI Configuration Manager

WAN Protocols
- PPPoA
- PPPoE
- 2684
- 1577
- WAN Multiplexing

Security/Address Translation
- SSH
- SPI Firewall
- Packet Filtering
- SSL
- Policy Database
- Content Filtering
- Port Forwarding
- IPSec Passthru
- NAT/NAPT
- UPnP IGD NAT Traversal

Packet Backbone
- ICMP
- UDP
- Policy Routing
- RIP v1/v2
- TCP
- HTTP
- Port Routing
- Static Routes
- IPv4
- Quality of Service Framework

PSP

ATM
- AAL5
- 8 PVCs
- UBR
- CBR
- ABR
- VBR
- OAM

ADSL
- TI.413
- 992.1
- 992.2
- A, B, C
- G.hs
- stats

802.1d Bridging
- ACLs
- QoS
- Bridge Groups
- IGMP Snooping
- Ethernet Switch
- USB 1.0
- 802.11 AP

HAL

Linux Kernel
- UART
- Boot Loader
- BSP
- Flash
- VLYNQ™
- GPIO
- Clock
- INTC
- EMIF

Hardware Platforms: AR7, AR7W, AR7VW

The AR7 Network Support Package functional diagram

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Router Software Stack Features

Packet Backbone

Protocols

– ICMP
– IGMP v1/v2 and Multicast
– UDP
– IPv4
– TCP

QoS Framework

– Ingress Packet Inspection and Classification based on a configurable Payload Priority Database (PPDb) with early Packet discard based on System Congestion Notification
– Egress HTB Shaping or WRR per interface scheduling with Priority Queues
– Supports DiffServ DSCP, ToS at IP layer (PPDb)
– Mark or re-mark packets to make QoS work across different Domains
– Maps between layer 3 and layer 2 QoS schemes to maintain end to end QoS
– Support for Trusted and Un-trusted Interfaces
– DSL Forum TR-059 compatible
– Optimized to sustain Voice Quality under heavy data traffic
– Common Linux Kernel bottlenecks removed or optimized

Bridging

– 802.1d Source Transparent Bridge with support for 255 MAC addresses
– Multiple bridge groups for physical DMZ's or port isolation
– Layer 2 Access Control Lists for Permit/Deny by port, MAC address and frame type
– IGMP snooping to control multicast flooding
– Bridge traffic participates in overall QoS

Routing

– IP forwarding
– RIP v1/v2
– Policy routing
– Ability to map LAN ports to PVC's

Address Translation

NAT Options

– Basic NAT
– Bi-Directional NAT
– Static port mappings
– Port Forwarding with NAT DMZ port

Policy database with port/protocol information for common applications

– Upgradeable
– Same information used for firewall

UPnP IGD 1.0 NAT Traversal Application Layer Gateways

– FTP
– IRC
– TFTP
– Talk
– H.323 Point to Point
– PPTP w/GRE
– IPsec Tunnels

WAN Protocol

Protocols

– RFC 2684 Routed or Bridged
– RFC 2516 PPP over Ethernet
– RFC 2364 LLC or Vc Mux PPP over ATM
– RFC 1577 CLIP over ATM

PVC Multiplexing with ability to multiplex different connection types over a single PVC

PPO On-Demand support with Traffic Selection capabilities

Network Management

User and Standard Based Management Applications

– CLI Telnet (Remote and Local)
– Web pages with HTTP/HTTPS server
– RFC 3164 Syslog for logging
– UPnP™ IGD 1.0
– DSL Forum TR-69
– SNMP v1,v2, v2c Agent with MIB II Groups
  • System
  • Interface Control Message Protocol (ICMP)
  • Internet Protocol (IP)
  • Interface

TI Configuration Manager with XML database for comprehensive management

Tech Support account for remote access

DSL Forum TR-068-specified Access Control List for management access

Extensive policy database: connection, servers, applications, game servers

Flash ROM upgradeable

Image disaster recovery

Expanded test and diagnostics

Detailed Statistics

Gateway Services

DHCP Client/Relay/Server

DNS Relay/Proxy

Dynamic DNS (DynDNS and TZO)

Simple Network Time Protocol (SNTP)

IGMP v2 Proxy/Snooping

Support for TI VoIP (SIP/MGCP/App Service) software and CODEC's

Firewall/Security

Stateful Packet Inspection Firewall (SPI)

Extensive firewall rule database for well known applications

SSL support via OpenSSL

Secure Shell (SSH) v2

Denial of Service protection from common attacks

Digital signature for firmware upgrades

Other Features

LED API

Software support for hardware reset to default

Boot loader with POST (Flash warning LED)

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