



Networking@NeST

NeST has over 100 person-years of experience in developing a wide range of solutions in the networking domain. These include solutions for Ethernet, wireless and home networking. The experience span covers development and testing of applications against protocols and standards, stack implementations etc. NeST has worked along with some of the leading names of the industry in development of networking standards.

## TECHNOLOGY SKILL SET

Technology	Protocols/Standards
<ul style="list-style-type: none"> <li>• Real-time multimedia streaming over Ethernet</li> <li>• Streaming multimedia over wireless LAN</li> <li>• Routers, Hubs and switches</li> <li>• Wireless-LAN Driver development</li> <li>• Home Networking</li> <li>• Network stacks/protocols</li> </ul>	<ul style="list-style-type: none"> <li>• 802.11 a,b,e, g</li> <li>• TCP/IP</li> <li>• HTTP</li> <li>• PCP3</li> <li>• IPV6</li> <li>• SNMP</li> <li>• NAT</li> <li>• H323/H261</li> <li>• G711/GSM</li> <li>• IEEE 1394 Firewire</li> <li>• RTP/RTCP</li> <li>• Bluetooth</li> <li>• IEC 61883 –1 AV/C</li> <li>• IPSec, Kerberos,</li> </ul>

## PROJECT BRIEFS

### Linux Dual Stack Router

This project was to develop a Dual Stack Router (Router supporting IP v4 and v6) powered by a variant of the bamboo board. Development using the embedded Linux kit, Monta Vista. The OS backbone had to be tailored to support a feature rich router with a robust control and configuration via Web, SNMP and serial interfaces. The Linux based IPv6 source tree viz USAGI is chosen to be the base IPv6 code. The project involved firmware development and testing.

### Wireless Home Gateway

Developed a Wireless Home Gateway solution that allows an authorized wireless client to login to the network, access machines in the local network (both wired and wireless) and access the Internet from behind a firewall. On the administration side the system allows maintenance of user lists, ACLs and firewall configurations.

The components developed include the firewall implementation using stateful packet filtering, authentication authorization accounting(AAA) using RADIUS implemented on the hardware and a VPN built over IPSec suite of protocols.

### Wireless Stack Implementations

A series of projects were done on the WiFi domain for developing a residential gateway solution.

Developed host drivers for IEEE 802.11a, 11b and 11g on PRISM and Atheros chipsets using a customized version of Linux for residential gateways. Implemented the security specification through modification of the IEEE 802.11 MAC core. The work involved modification of the existing IEEE 802.11 MAC core and adding 802.11i functionality by modification of the driver firmware. Implemented QoS specification (IEEE 802.11e) over IEEE 802.11b driver. The implementation follows a method of polling in which the AP controls all traffic in the medium. QoS layers are implemented above the 802.11b drivers and the 802.11b drivers are modified in STA and AP. Demonstrated the QoS mechanisms through transmitting real-time MPEG data over RTP/RTCP and by reserving bandwidth under different traffic conditions.

### Bluetooth stack Implementation

Developed a Bluetooth protocol stack including L2Cap and SDP and integrated it with a CAN

## NeST Networking Capabilities

network using a Bluetooth-CAN gateway. The implementation was tuned for embedded platforms.

An additional Bluetooth – MOST (Media Oriented System Transport) Gateway module provides an interface between the Entertainment and Navigation system in the vehicle with the outside world through wireless.

The gateway uses an Ericsson Bluetooth Base band module and is based on Hitachi H8S2623 Controller. The Gateway Firmware interfaces to the HCI layer through an USB transport layer

### **IEEE 1394 Wireless Bridge**

Implemented the wireless bridging concepts specified in IEEE 1394.1 for connecting independent 1394 networks.

Asynchronous and Isochronous data transmission over wireless is demonstrated.

### **1394 Stack for Digital Set Top Box**

Implemented the following standards/protocols over IEEE1394 using Toshiba TX39X processor.

- IEC 61883 –1 (Consumer Audio / Video Equipment Digital Interface)
- AV/C Digital Interface Command Set General Specification version 1.0
- AV/C Tuner Model & Command Set version 1.0 and AV/C Tuner Broadcast System Specification – Digital Video Broadcast (DVB) version 1.0.
- AV/C Digital Interface Command Set VCR Sub-unit Specification version 2.0.1
- Run Length Encoding, Adaptive Huffman and DPCM of motion vectors.

### **PacketCable SoftSwitch**

Softswitch is a software-based switching solution that runs on standard hardware to supplement or replace central office switching functions. Softswitches also allow telecommunications to preserve interoperability with PSTN networks, and assure a smooth transition to packet-based IP technology.

NeST Softswitch implementation is for cable environment and is 100% compliant to the PacketCable 1.0 specifications. The implementation is modular enough to reuse the individual components as required. The development platform is Linux. The support can be easily extended to Solaris platform also.

### **BNAT**

Beyond NAT system facilitates servers under different LANs to function without a single external IP. Only the management network (usually located at Beyond NAT service provider's premises) needs external IP. With four global IPs, a service provider can support hundreds of servers running at different LANs. Client applications issue DNS queries before each connection. BNAT system identifies the correct

server based on the DNS query most recently made. In this system reply for all DNS query will be same IP, the IP address of the BeyondNAT Router (BYR), irrespective of FQDN request.

The generic BeyondNAT strategy that solely depends on DNS query fails for applications where client issues single DNS query and multiple connection requests. Such applications have to deal with protocol specific strategy. BeyondNAT support most of the application protocols. It includes Telnet, POP3, SMTP and HTTP 1.1.

### **ADSL Switch**

Developed a software for Asynchronous DSL (ADSL) access switches and ADSL access routers. The Bandwidth Optimized DSL Access Switch (BODAS), a third generation DSL platform. The BODAS assures customers can receive guaranteed service levels for mission critical, video, voice, and data applications over a low-cost DSL access network.

Components of the system were:

- Bandwidth Optimized DSL Access Switch (BODAS) at the service provider side
- BODAS interfaces with the Bandwidth Optimized ADSL Router (BOAR) at the customer premises.

### **Multi-point Video conferencing system**

The project implemented a videoconferencing system on ITU H.323 standards for multimedia communications over packet switched networks. This video conferencing system consists of two components, the video conferencing server and client. Up to 30 clients could be supported at a time.

H.323 and associated protocols using H.261, G.711 and GSM media formats were used for the implementation. The platforms were Windows 2000/NT for the server and Windows XP/2000/98 for the client.

Features include Audio/Video conferencing, Data and whiteboard facility, application sharing, billing conference booking and system administration tools. Even clients behind NAT could participate in the conference.

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**For more information on NeST's service offerings, please contact:**

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