

Second Foundation, Inc.

Representative Project Summaries



Internetworking & Telecommunications

NMS / SNMP

- Development of **Network Management System** on Solaris for major switch manufacturer, including X/Motif based GUI. The software made extensive use of IPC (shared memory, message queues, semaphores) and multithreading (Solaris threads). Integrated software with **HP OpenView** including the **GUI** and **handling of Events / Traps / Alarms**.
- Porting of **SNMP based Network Management System** for major packet switch manufacturer from SunOS to Solaris, with X/Motif based GUI front end. Made several enhancements in element management and alarm handling. Integrated NMS with **Solstice EM**.
- Developed **proxy server** for **NMS** for **WATM (Wireless ATM) Network**. Did extensive research on WATM RFCs / manuals. Defined scenario / preliminary design for proxy server which would **translate SNMP directives** received via UDP into SNMP over SVC on WATM. This also included providing a scheme for translating IP addresses into WATM addresses, and allowing for **routing capabilities** on the WATM side.
- Did design and implementation of **Network Management System** application of the Es100e/D4000 (an Ethernet/ATM bridge/router equipment with VLAN capable). The project was being developed on top of **HP OpenView SNMP Management Platform** with HP OpenView Windows as its environment..
- **Developed hierarchical system of SNMP Agents** designed to manage an RPCU

system. The master SNMP agent, resides on master component of RPCU and manages a distributed MIB for network sub-elements. The sub-agents manage and reconcile the sub-MIBs.

- **Implemented an SNMP client(monitor)** for EDI protocol testing. Also implemented **MIB-II version 1** and Enterprise specific Objects. Provided communication via **UDP**, and incorporated support encoding / decoding data in **ASN.1**.

Protocols / Signaling

- Performance Analysis of **TCP/IP protocol stacks on SVR4** for major network appliance manufacturer. Identification of bottlenecks vis-à-vis specific features provided by customer, e.g. IP multicasting. Suggested / implemented architectural changes / enhancements to the stacks and drivers for the above.
- For major European Telecom company, studied the ITU standards for **Transaction Capabilities layer of SS7 stack**. Designed the **test plan** for the Application Specific Entity for the Completion of Call to Busy Subscriber. Coded the **test cases** according to the test plan.

Validated the messages and various parameters for **ISUP, INAP, TCAP and DSS1**. **Prepared the test plan** conforming to France Telecom specification and ITU standards for INCS1. **TCAP standards Q.771-Q.775** were used.
- For major European Telecom company, **Verified test plan** in conformance with customer specs and **Q.931 for layer 2 and layer 3 messages**. **Validated DSS1 protocol messages** for ISDN subscribers.

- Implemented **CR-LDP** (Constraint based Routing Label Distribution Protocol) - Rev 3 for **ATM switch**. Also implemented CR-LSP modification draft for MPLS – Rev 1.

This involved extensive groundwork / training / experience of **ATM Traffic Management and Constraint based Routing**. The implementation provided for Manual configuration for CR-LSPs and support on ATM links.

- Implemented **LDP for MPLS**. This included implementation of LDP (Label Distribution Protocol) draft – Rev 5. Also implemented ATM encapsulation draft for MPLS – Rev 2. The implementation used **RIP for routing**, supported Label Switching of IP packets on ATM links and **provided configuration via SNMP**.
- For **ISDN (Layer 3)**, provided support for **formatting and unformatting of Q931 messages** and **Information Elements** as well as providing the state machine for handling the both user side and network side interactions.
- Developed **Media Access Control (MAC) Layer Driver** of PMP HT-RT Air Interface stack. The MAC and LAPP(enhanced ITU-T Q.921) sub-layers form Layer 2 of the TCP/IP stack over wireless radio, between HT and RTs for reliable OA&MP.
- Performed QA and test automation for Sun's **classic IP over ATM**. Configured Cisco switches, and verified successful operation of routing packets via **RIP and HELLO**.

Analyzed RIP packets at protocol level. Also diagnosed / tested **ARP, RARP, IP, ICMP, IP**, etc packets for both **IP and IPv6**.

Misc.

- Worked on project to provide Intelligent Network functionality for major wireless device manufacturer. Specifically worked on **Provisioning and Data Management System** developed in C++ on Solaris. Provided support for acting as generic mediation device between end users,

network elements and business systems such as customer care, billing and service activation. PDMs .

- Developed software in **C++ on UNIX** to **test the performance of a GSM network** using a fixed line network as a comparison. PSTN connectivity was through MSC. The **failure rate** of GSM network was calculated following a counter update and was subtracted from the total failure rate to output the desired result.

Also developed software to provide figures for **occupied and free traffic channels** as well as failed attempts in a busy hour. Different cells were taken for samples where frequency channels are monitored for their occupancy. Average of such channels in a desired area is calculated for traffic density.

- Responsible for **QA of ISRO router**. Formulated **test plans** and devised test procedures. Set up **router test bed**. **Tested RIP at protocol level**. Performed **test automation** using C and shell scripts.

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