Sample Router Development Projects

- Multi-Service Provider Edge
- Broadband Remote Access Server
- Service Edge Router
- Universal Convergence Gateway
Multi-Service Provider Edge (1/2)

- **Products:**
  - Next-generation IP/MPLS multiservice edge - a single, powerful packetized infrastructure that delivers voice, video, data, and wireless services.

- **Scope of Work:**
  - Develop new features, sustaining on Data-path & Networking
  - Develop test plans, test cases, and test scripts
  - Execute functional, system, regression, and performance test
  - Develop automation test framework
  - Maintain and enhance test scripts

- **Technologies:**
  - Modern mid-plane architecture design
  - Networking
    - IP/MPLS, frame relay, serial line, ATM, Ethernet, PPP, IPSec, DSL, etc.
    - TCP, UDP, HTTP/HTTPS, FTP, TFTP, IP-VPN, L2TP, routed IP
  - Software, languages, and tools
    - C/C++, Java
    - Wireshark, Net-SNMP, SNMPc, IxExplorer/IxLoad
    - IXIA, Spirent, ATS Automation Test Framework
**Embedded Systems:**
- Fully deterministic performance – no reliance on flow cache hit rate
- A PowerPC™ MPC7447 G4 processor running at 600 MHz with on-chip 512 kbyte L2 cache and MPX, running in a single-processor configuration.
- A Marvell Discovery II system controller.
- 512 Mbyte of DDR-SDRAM memory.
- A 64/32-bit PCI bus running at 32/66 MHz.
- 64 Mbyte of onboard Flash memory.
- Dual/independent gigabit Ethernet interfaces.
- Dual serial interfaces.
- Embedded Operating System: CG Linux
- Flexible mid-plane architecture
- High-density I/O
- Network Processor Data Path
- Control Plane Engine Scalability
- Line rate forwarding at any packet size
- Built In Scalability
- Card re-use across product family
**Broadband Remote Access Server (1/2)**

- **Products:**
  - Broadband Services Router is a high-performance router designed for large points of presence (PoPs).
  - An edge routing platform that is optimized for large circuit aggregation applications

- **Scope of Work:**
  - Develop new features, sustaining, hotfix
  - Develop test plans, test cases, and test scripts
  - Execute functional, system, regression, and performance test
  - Develop automation test framework
  - Maintain and enhance test scripts

- **Technologies:**
  - Networking
    - IP, PPP, PPPoE, PPPoA, DHCP, AAA, Radius
    - TCP, UDP, HTTP/HTTPS, FTP, TFTP
    - Multicast routing, DVMRP, PIM
  - Software, languages, and tools
    - C/C++, Java
    - IXIA, Spirent, Automation Test Framework
Leverage ASIC + RISC

Processor Architecture:
- RISC processor provides flexibility
- ASICs and FPGAs provide hardware assist to achieve high performance
- Fully deterministic performance – no reliance on flow cache hit rate

ASIC and FPGA Functions:
- Buffer management
- Queue management
- QOS scheduling
- Address lookup
- Flow classification
- Flow rate measurement
- Statistics support

RISC Processor Functions:
- RISC processor provides flexibility
- L2/L3 packet header parsing
- L2/L3 packet header modifications
- QOS control
- Classification control
- Statistics control
Service Edge Router (1/2)

- **Product**: Combining network transport services and IP services in one MPLS platform and a gateway between GPRS/UMTS and other external packet data networks such as radio networks, IP networks, or private networks.

- **Scope of Work**:
  - New Feature Development
  - Maintenance
  - Product Verification/Testing
  - Technical Support
Service Edge Router (2/2)

- **Technologies**
  - Embedded and Real-time OS: VxWorks, RT-Linux
  - IP Service Operating System
    - *Software framework and libraries for IP applications*
  - Networking
    - *Layer 2-3*
    - *IP services (traffic shaping, NAT, DDoS, etc.)*
    - *VPN, VPRN, ATM, Frame Relay, MPLS*
    - *GTP, GTP Billing, RADIUS Authentication/Accounting*
  - Software, Languages, and Tools
    - *C/C++, Java, CORBA, TCL, SilkTest*
    - *STAF, W32/mshtml, Wireshark, IxExplorer/IxLoad*
    - *IXIA, Spirent, ATS Automation Test Framework*
    - *Net-SNMP, SNMPc*
Universal Convergence Gateway

- **Product**: FMC (Fixed Mobile Convergence) platform that concurrently supports 3GPP, 3GPP2, ETSI and PacketCable standards for next-generation applications.

- **Scope of Work**:
  - Product verification
  - Automation development
  - Sustaining and new feature development

- **Technologies**:
  - VxWorks
  - Networking
    - *Layer 2-3, L2TP*
    - *IP services (traffic shaping, NAT, DDoS, etc.)*
    - *Virtual Router, VPN, VPRN*
    - *SIP ALG, SIP NAT ALG, SIP DoS, SIP authentication, SNMP, MPLS, OSPF, etc.*
  - C/C++, Java, TCL
THANK YOU!

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