Abstract Summary

• How to design an open standards based Media Gateway
• Emerging open standards in the industry
• How is RadiSys embracing them
• About RadiSys’ Application Ready platform and other building blocks
3Ws of VoIP?

• **What?**
  - Piggybacking voice traffic on to data traffic and bypassing these high-tariff regulated networks.

• **Why?**
  - Cost Benefits
  - Single Network

• **When?**

![Graph showing Gateway Sales from 1998 to 2003](source: Cahners In-Stat. Group)
Driving Factors in VoIP Applications

- **Reliability**
  - High availability

- **Performance**
  - Voice quality (QoS)
  - Density
  - Interoperability
    - Signaling
    - Backward compatibility
    - Migration path

- **Price/performance (cost/port)**

- **Bandwidth usage**

Source: Forrester Research, July 1998
What Impacts QoS?

- Quality of Voice Compression
- Echo Canceller
- System Delay
  - Jitter buffer
  - Bad frame masking
  - Processing delay
- Network Delay
  - Controlled by ISP/CO
Open Standards

- CompactPCI
- H.110 Telephony Bus
- RTOS
- Algorithms
  - ITU-T
  - DAIS
- Call Control Protocols
  - IETF/TIPHON/ITU-T
    - MEGACO
    - H.323
    - SIGTRAN
- Software Framework
  - DSPBios (Planned Activity)
What is DAIS?

- **DSP Application Interoperability Standard from TI**
- DAIS algorithms are easy to integrate in any application
- Clean performance characterization
- Defines the memory requirements of the algorithm
- Common API’s -- easy to plug in
How Is RadiSys Embracing DAIS?

• 14 voice coders have successfully passed DAIS test!
• Working under TI’s big umbrella -- eXpressDSP™ Technology
• APIs
  • G729ENC_encode(handle, pInBuf, pOutBuf)
  • G729DEC_decode(handle, pInBuf, pOutBuf)
  • G723ENC_encode(handle, pInBuf, pOutBuf)
TDM-IP Media Processing Architecture

**Middleware:** H.323, Signaling, Protocols and Industry Standard frameworks -- CT Media, ...

**TASK6000 APIs - Universal Port API**

**Telecom Kernel**
- Composer & Kernel for Windows NT, VxWorks

**Algorithms**
- G.711, G.723.1, G.726, G.729, G.729A, Echo Canceller, DTMF, MF-R1/R2, V.17 Fax, AGC/VOX, CPM

**Drivers & 3rd Party Development Tools**

**RadiSys Building Blocks**
- Telecom Kernel
- Composer & Kernel for Windows NT, VxWorks

**SW**
- Host OS
  - WinNT, VxWorks, Unix, Linux, etc

**HW**
- Slave CPU
  - EPC-20x (x86 Controller CPU)

**Private Ethernet Bus**

**Public Ethernet Bus**

**CompactPCI Bus**

**Rear Panel I/O**

**I/O**
- Telephone Port
- Custom Interface
- Frame Relay
- ATM

**J3**

**H.110**

**E1/T1/LAN**

**SPIRIT-6040E**
- (C6x DSP Resource)

**Remote Access**

**PBX**

**Pooled Modems**

**Remote Access**

**Call Centers**

**BSCs**

**CTI**

**AIN/IN**

**RadiSys Building Blocks**
SPIRIT Family

- **SPIRIT6020-PCI**
  - Two C6201 DSPs @ 200MHz ea.
  - i960RD as IOP
  - Targeted for Call Center/IVR/CTI applications

- **SPIRIT-6040E**
  - Four C6201 DSPs
  - i960RD as IOP
  - Up to 48 ch. Of VoIP
  - Dual 10/100BaseT
  - Up to Quad E1/T1 via PMC
Voice Codecs & Telephony Algorithms

Middleware and Protocol Stacks (under development)

Telephony
- AGC/VOX
- Echo Canceller G.165/G.168*
- Comfort Noise Generator
- DTMF Detector/Generator
- CPT MF-R1, MF-R2

Vocoders (ITU-T)
- G.711
- G.723.1
- G.726
- G.729
- G.729/A
- GSM
- DAISed

Fax
- V.21
- V.17 Group III
- V.29
- V.27ter
- T.38

Modems†
- V.90
- V.34
- V.42bis

* Planned
† Through Partner. Not available today

Telecom Application Specific Kernel (with host API)
- UniversalPort, DSP resource management, QoS management
Telecom Application Specific Kernel (TASK 2.0)

- Application composer and a Real-time Telecom Kernel for ‘C6x DSP
- Supports dynamic channel switching
- Universal Port API
  - Flexible development environment for V/FoIP applications
  - No DSP and low level programming
  - Runs under VxWorks O.S
- Resource Manager
  - Host based API for management of all SPIRIT devices
  - Request a resource based on type and capabilities
  - Allocate a particular resource and register the capabilities which will be in use
  - Reallocate a resource with a different set of capabilities, which the RM will track
  - Free a resource
  - Display resource usage (version 3.0)
TASK 2.0 Architecture

Host CPU

- User Application
- Host APIs
  - Load Processors
  - Resource Management
  - Resource Configuration/control
  - Hot Swap Notification/Control
- Spirit Driver
- Hot Swap Service/Driver

IOP/DSP

- User Application
- IOP APIs
  - Load Processors
  - Resource Configuration/control
- IOP Drivers
- UPA Application
  - Receive Control Messages
  - Send Events
  - Codecs and other services
  - Sophisticated users may add additional services
- DSP APIs
  - Send/Receive Messages
  - Send/Receive Ethernet Packets
  - Send/Receive TDM data
- TASK Kernel

40% free for user Apps.
Application Ready Platform

Processing Engines
- DSP resources
- CPUs -- Master and Slave
- I/O (LAN/WAN)

Algorithms
- Voice Coders
- Fax
- Telephony (AGC/VOX, CPM, CNG, DTMF)
- Echo Canceller

Software
- BSP
- TASK 2.0

Protocols
- H.323
- MEGACO
- SS-7

Signaling
- MF R1/R2
- CAS/CCS

Port/Develop Your Applications
- Trunking Gateways
- Signaling Gateways
- AIN/IN Services
- CTI/IVR
- and more...

System Integration
- Chassis
- Backplane
- Power Supply
Summary

• Telecom is moving towards standardization
• RadiSys is working very closely with its partners, like Intel and TI, to make this happen
• DAISized all the voice coders
  • Work on telephony algorithms in progress
• RadiSys can provide an Application Ready Platform for VoIP/SS7 applications