

Satellite Modems

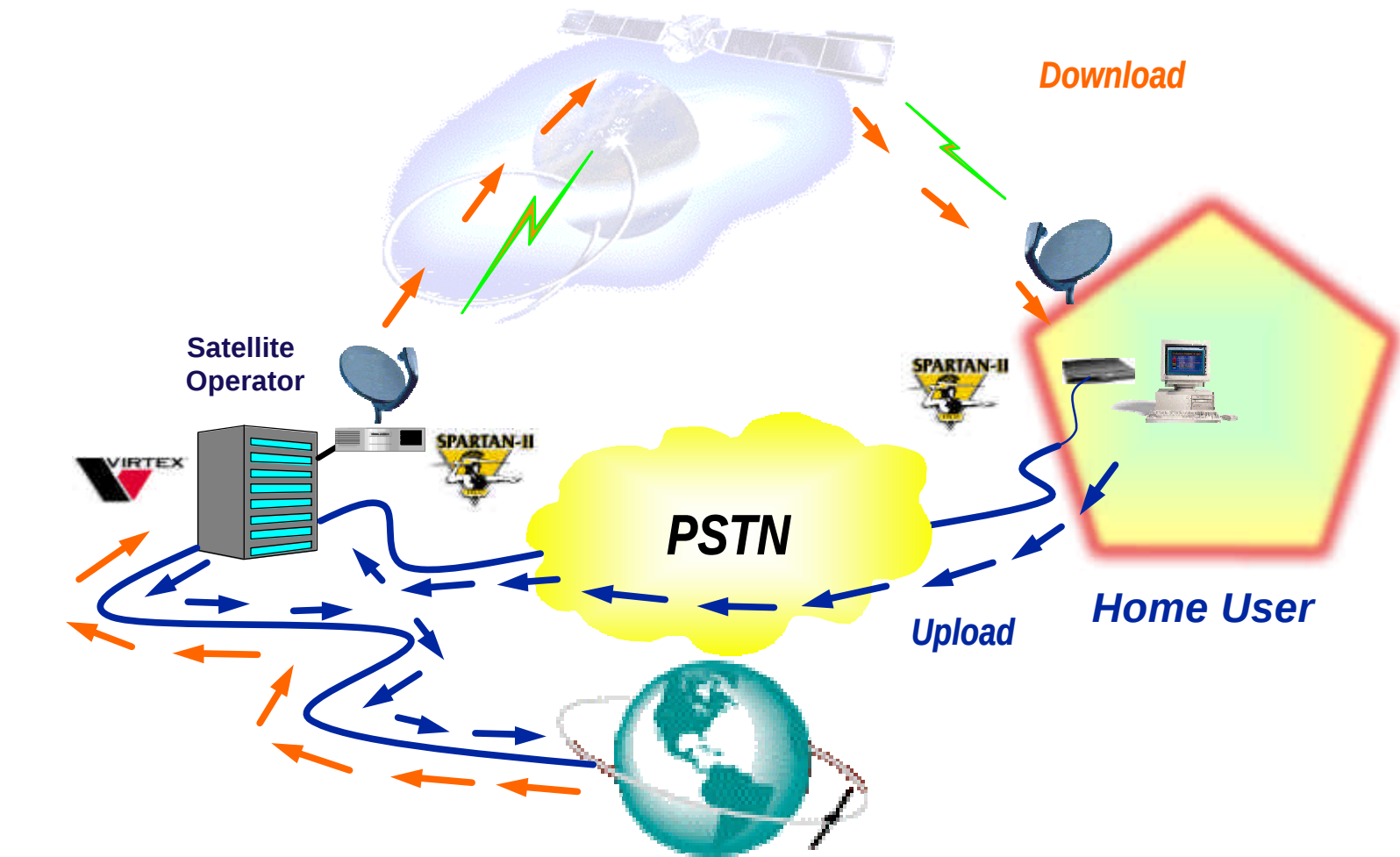


Satellite Modem Overview

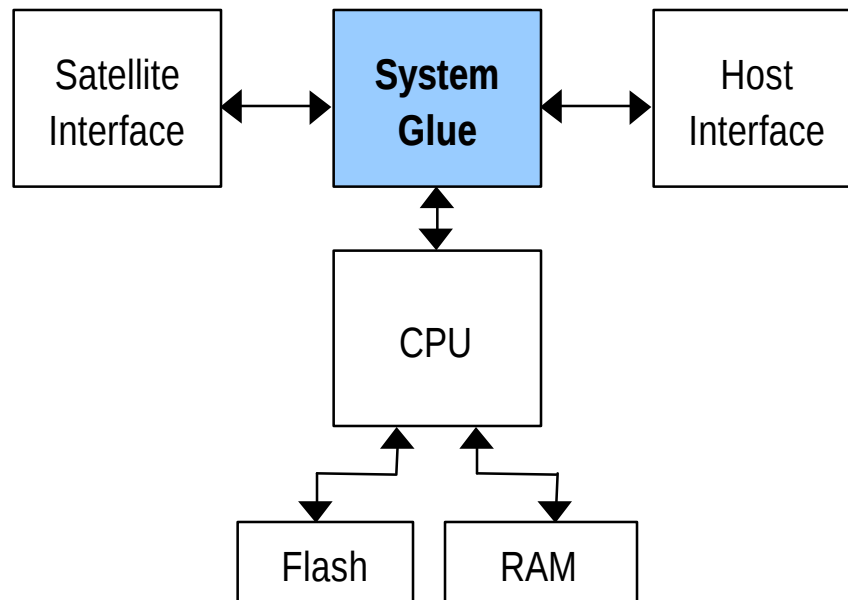
- ◆ Use the same transponders used to deliver TV
- ◆ Standards
 - DSS: Hughes Network Systems (HNS) proprietary
 - DVB (ETS 300-421): Open standards consortium
 - Primestar (ITU-R 217/11): Being phased out
- ◆ Issues
 - Shared media
 - Unidirectional, return channel is via modem
- ◆ Estimated \$100M modem sales in 1999



Data Broadcasting

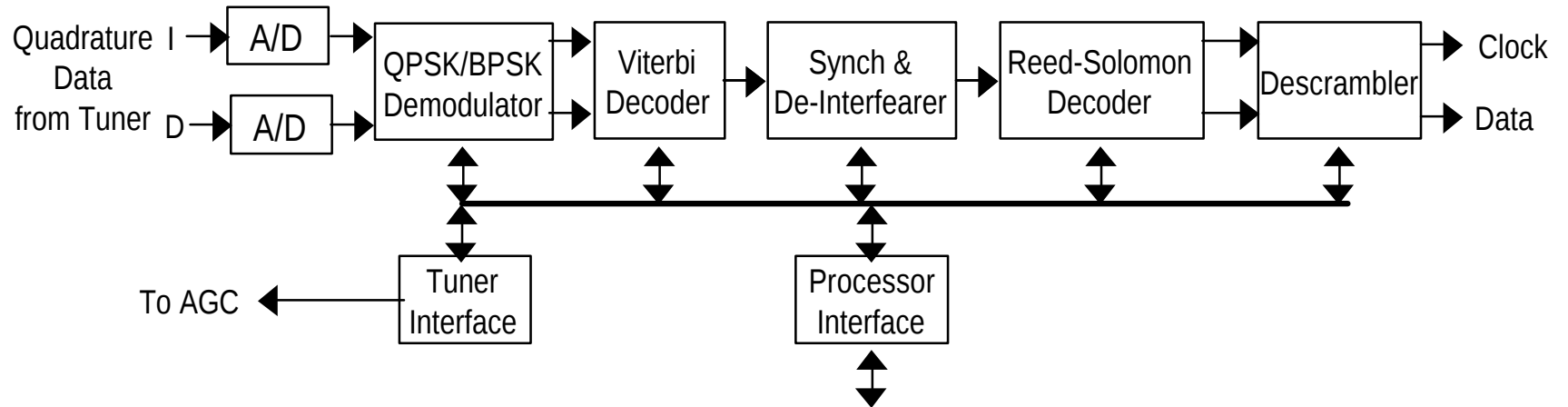


System Block Diagram



- ◆ Key functional blocks
 - Satellite interface
 - CPU complex
 - Host interface
 - Application specific system glue
- ◆ Application specific system glue is required for interconnecting ASSPs

Satellite Interface Components



- ◆ Tuner
 - RF components packaged in shielded module
- ◆ Decoder
 - Single ASSP
 - Processor interface
 - Eight bit microprocessor bus, serial, I²C, etc.



Satellite Interface ASSP Providers

- ◆ Market is dominated by Conexant Systems and Broadcom Corporation
- ◆ Both are single chip solutions
 - Demodulator
 - Forward error correction
 - Dual eight-bit A/D converters

Supplier	Components	Processor Interface	Standards	Availability
Broadcom	BCM4201 Universal Satellite Receiver	I ² C, SPI	DSS, DVB, Primestar	Now
Conexant	HM1211 Demodulator	serial, motel	DVB, DSS	Now

Host Interfaces

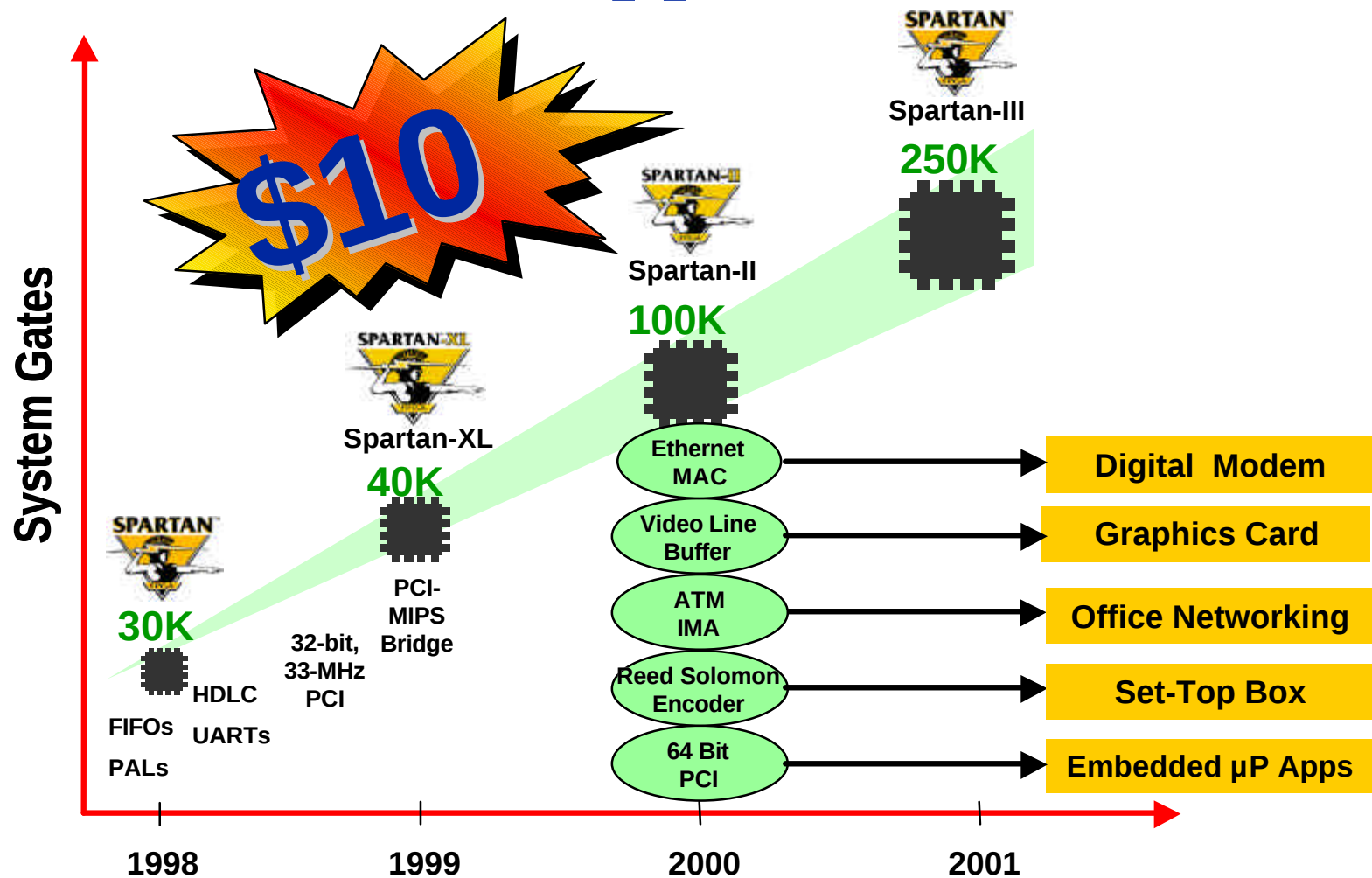
- ◆ Popular interfaces for satellite modems
 - USB for external modem
 - PCI for add-in card
- ◆ USB
 - Comes with all new PCs
 - Customer does not have to open PC
- ◆ PCI
 - Lower cost, no case or power supply
 - Limits system interoperability
 - No PCI slots in iMac

Satellite Modem Design

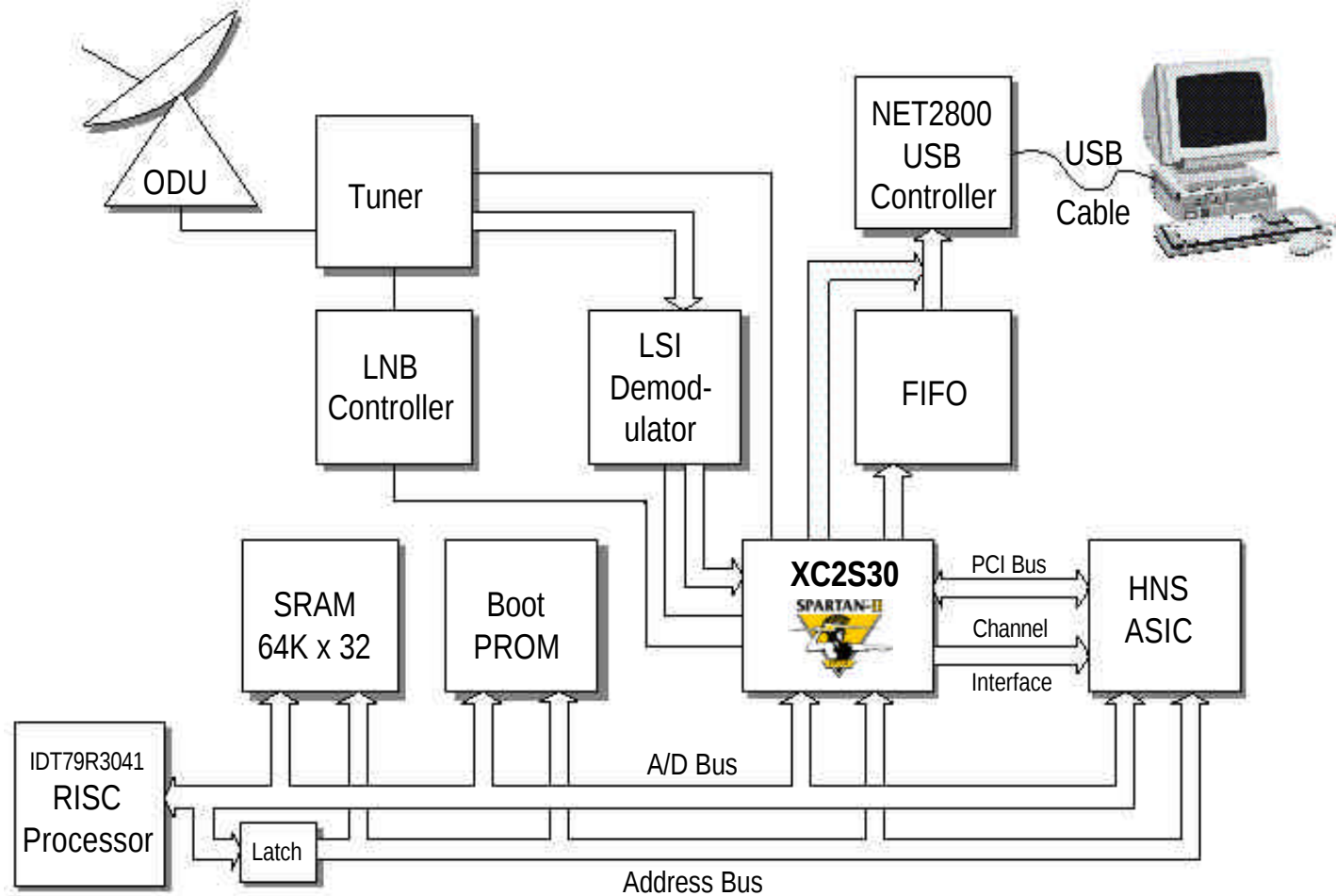
- ◆ HNS DirecPC®-USB receiver
- ◆ The challenge
 - Add USB interface to satellite modem architecture
 - Leverage ASIC technology developed for PCI card
- ◆ Spartan-II XC2S30 is used for system level glue, interfacing
 - CPU
 - Demodulator
 - HNS ASIC
 - USB controller



Higher Density Enables New Applications



Satellite Modem Block Diagram



* HNS Proprietary ASIC

Spartan-II Device Functions

- ◆ Processor interface
 - Control registers, watchdog timer
- ◆ Data buffer between HNS ASIC & demodulator
- ◆ 32-bit CRC check for incoming packets
- ◆ USB controller interface
 - Bus arbitration, FIFO control, DMA control
- ◆ PCI target interface
 - Lets RISC chip take over host processor functions

Satellite Modems

Quadrature Data from Tuner

I - Channel Input
Q - Channel Input

