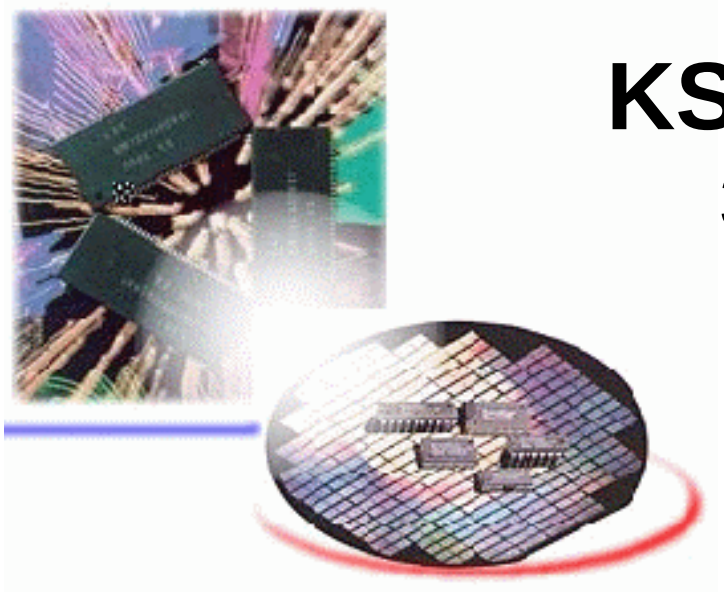
Excellence in Low-Power

The way MICOM/DSP should be



KS32C5000(A)/KS32C50100

32-bit RISC Microcontroller for Network Solution

Mar. 1999

SAMSUNG ELECTRONICS

Contents

- Network Protocol
  - What is Network ?
  - OSI Reference Model and TCP/IP
  - TCP/IP Networking Software & Basic Protocol
  - Real-time Operating System
- Real-time Operating System
  - Developping System with pSOSystem
  - pSOSystem BSP
  - Developping System with Nucleus
  - Nucleus H/W Device Driver
- Applicable System with SAMSUNG's NetMCU
  - Managed HUB
  - Managed Switching HUB
  - Router / Layer-3 Switching
  - Printer Server
  - Network Printer
  - Cable Modem
  - UPS Management Controller

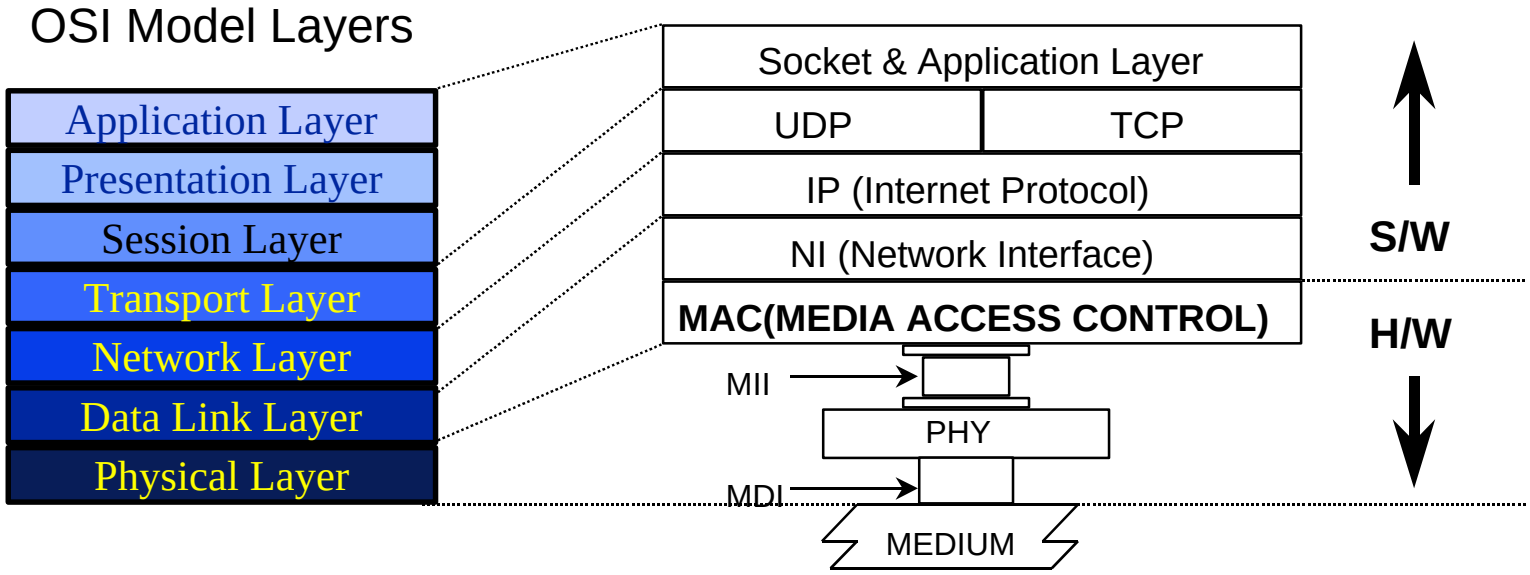
What is Network ?

- **Network Components**
  - **Hosts**
    - Any computing system that is attached to an internet
  - Networks
    - Collection of two or more hosts that are interconnected using a particular form of data link technology
  - **Router**
    - The device that provides connectivity between the various indivisual networks

- **Physical Network Technologies**
  - **Local Area Network (LAN)**
    - High speed, short distance
    - Ethernet, Token Ring, FDDI
  - Wide Area Network (WAN)
    - Low speed, global networks, long distance
    - X.25, ISDN with HDLC

- **OSI Reference Model**
  - **7 Layer for provides connectivity between the various indivisual networks**

- **TCP/IP Networking Software**
  - TCP/IP networking software provides a unified interface that is independent of the various indivisual networks



- **Network Interface Layer**
  - H/W MAC Driver
  - ARP (Address Resolution Protocol)
    - Mapping Internet address to physical network address
  - RARP (Reverse Address Resolution Protocol)
    - Obtain Internet address from physical network address
- **IP (Internet Protocol) Layer**
  - Routing, Fragmentation, Reassembly of Datagrams
  - ICMP Protocol
    - Error report and network management tasks
- **Transport Layer**
  - TCP (Transmission Control Protocol)
    - Deliver packet by connection-oriented method
  - UDP (User Datagram Protocol)
    - Deliver packet by connectionless method
- **Socket Layer**
  - Application Programming Interface
- **Application Layer**
  - TFTP, FTP, TELNET, DNS, NFS, RPC, SMTP, SNMP

- **Why we need RTOS ?**
  - Task management
  - Memory allocation
  - Interrupt completion service
  - Easy to develop application system that has network interface

- **What kind of RTOS is supported for SAMSUNG's NetMCU ?**
  - pSOS+ (ISI)
  - Nucleus (ATI)

- **Where can we get H/W device driver for RTOS ?**
  - Samsung WEB-Site : www.samsungsemi.com

- **How can we use the H/W device driver ?**
  - After download the H/W device driver from Samsung WEB site, you should extract and rebuild again for your purpose

pSOSystem Components

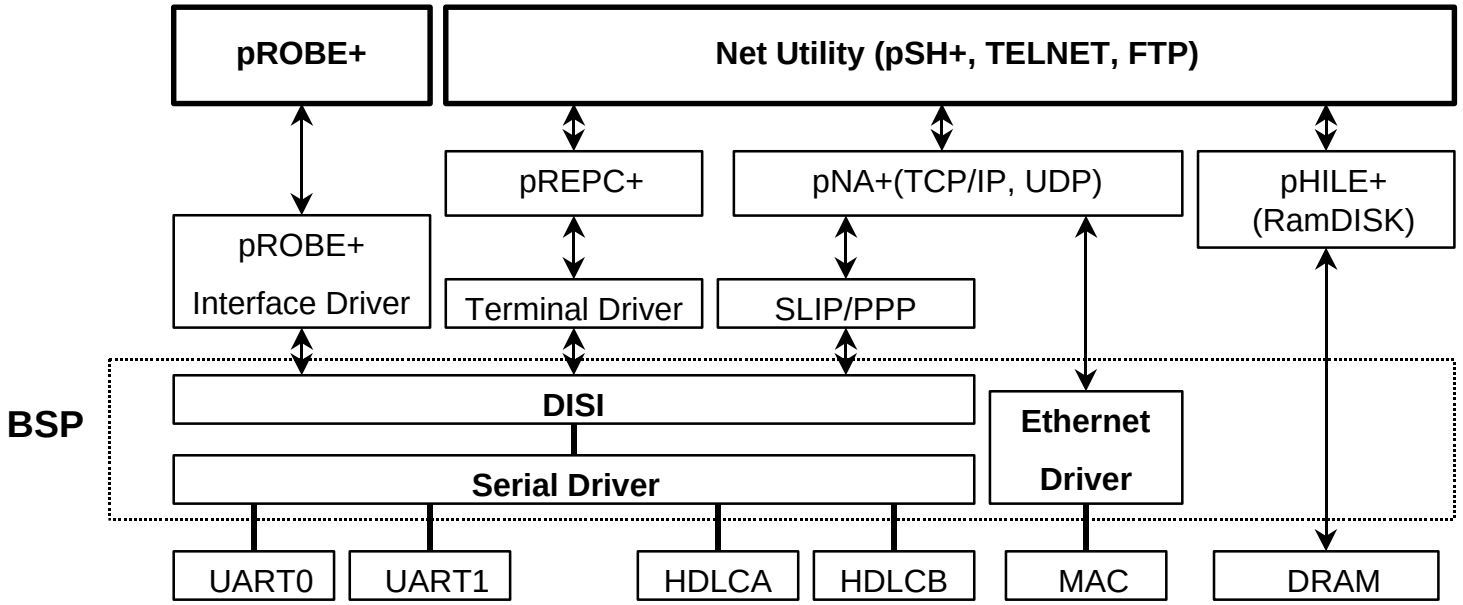
- pSOS+ : Single Processor Kernel
- pSOS+m : Multiprocessor Kernel
- pROBE+ : Target Based Debugger
- pHILE+ : File Management
- pNA+ : TCP/IP Networking
- PPP
- pREPC+ : ANSI C Run-time Library
- Drivers/Board Support Package(BSP)

pSOSystem Debugging Environments

- S/W Debugging Environments
  - pROBE+ ROM : Target Based Debugger interface ROM
    - ➲ Customer can get from **Samsung WEB site and ISI**
  - pRISM+ : Debugger interface running on host system
    - ➲ Customer should pay charge to **ISI**
- H/W Debugging Environments
  - Embedded-ICE
    - ➲ Customor can get from **ARM agent**
  - ARM SDT(Software Development Toolkit)
    - ➲ Customor can get from **ARM agent**

What is pSOSystem BSP(Board Support Package) ?

- **H/W device driver for pSOS system**
  - Timer
  - Serial Driver (UART, HDLC)
  - MAC Driver



Nucleus Components

- Kernel
- NET4.0 : TCP/IP Protocol stack
- Extended Protocol Package for Nucleus NET
- PPP
- File System

Nucleus Debugging Environments

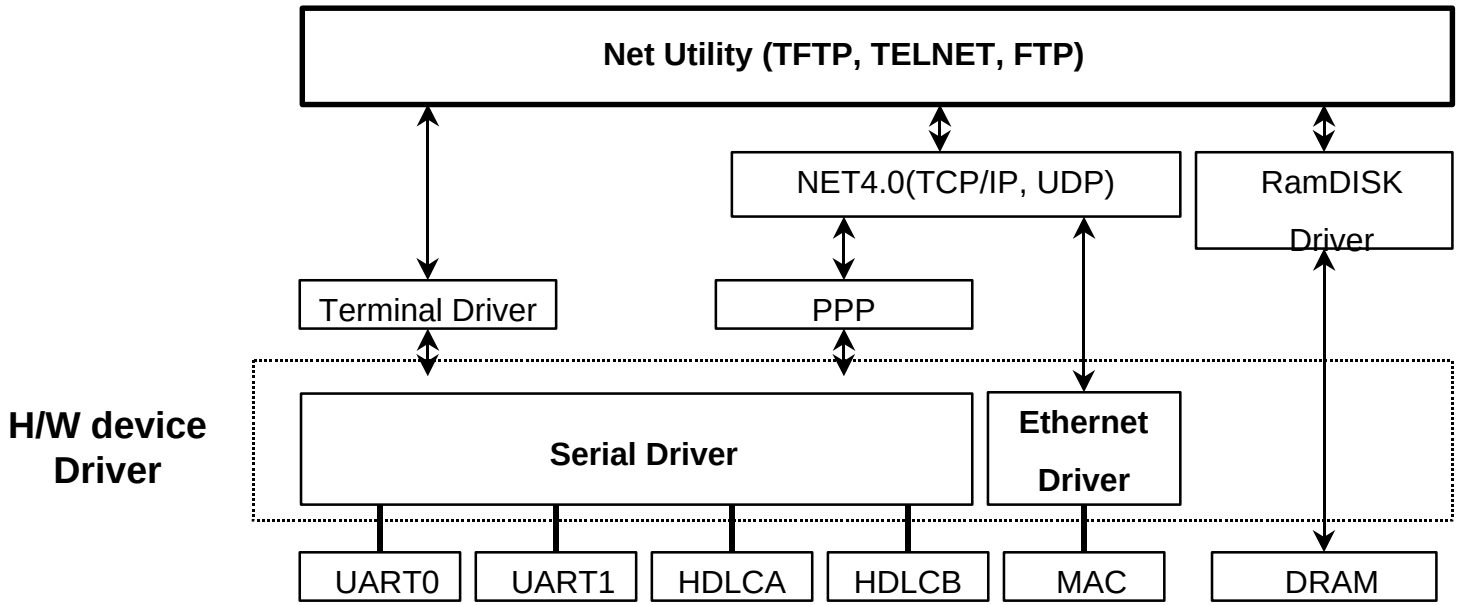
- S/W Debugging Environments
  - UDB
    - ➲ Not supported yet
- H/W Debugging Environments
  - Embedded-ICE
    - ➲ Customor can get from **ARM agent**
  - ARM SDT(Software Development Toolkit)
    - ➲ Customor can get from **ARM agent**

Supports

- Samsung : H/W Device Driver for Nucleus
- ATI : All Nucleus stack
- Application : Application designer (Customer side)

H/W device Driver for Nucleus

- Timer
- Serial Driver (UART, HDLC)
- MAC Driver

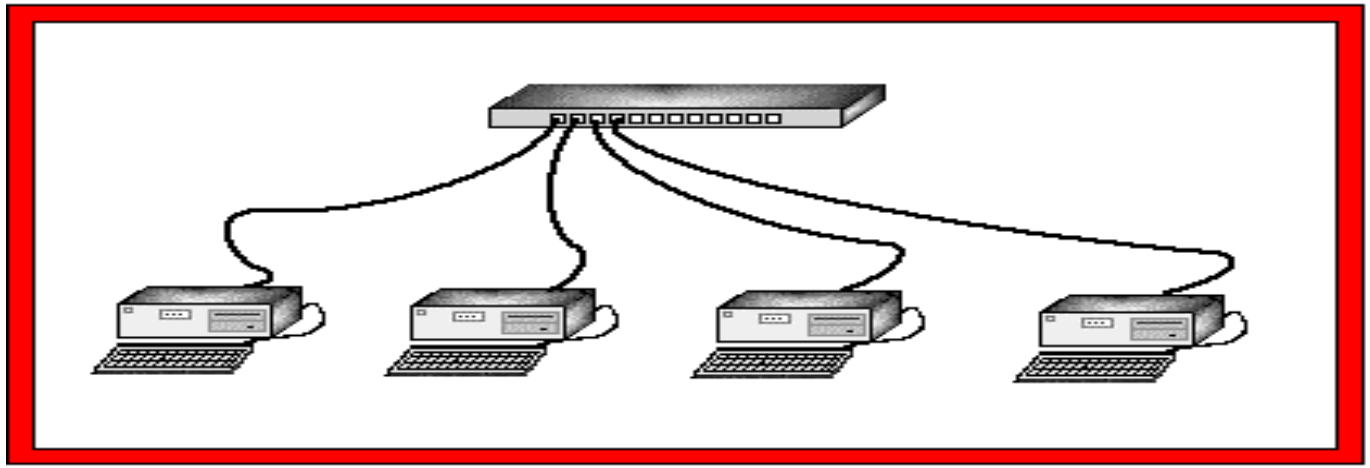


- PMAKE

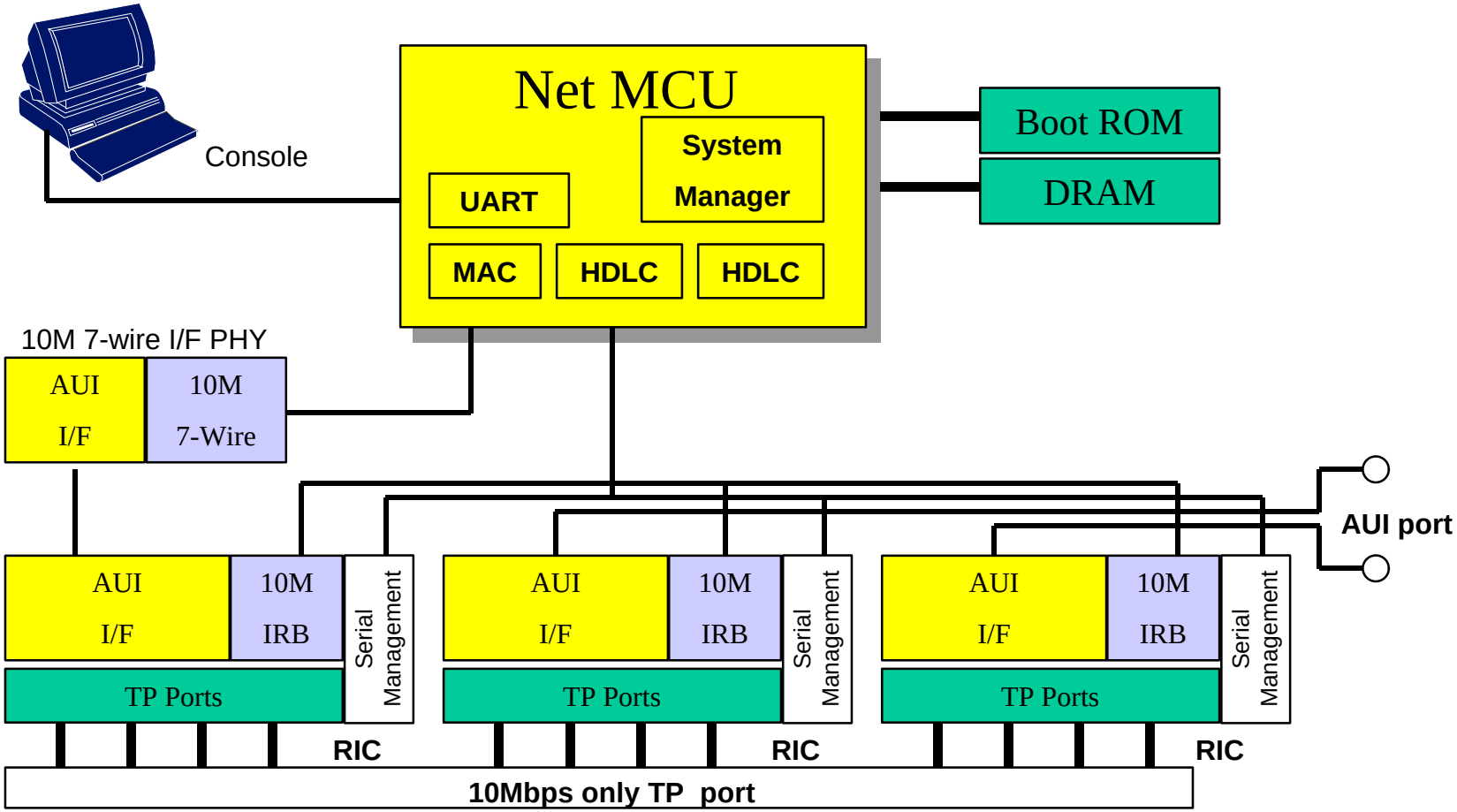
Applicable System with SAMSUNG's NetMCU

- **Managed HUB**
- **Managed Switching HUB**
- **Router / Layer-3 Switching**
  - Modem Router
  - IP Router / IP Sharing
  - ISDN Router
  - ADSL Router
- **Printer Server**
- **Network Printer**
- **Cable Modem**
- **UPS Management Controller**

- **Network Topology**
  - The physical and/or electrical configuration of cabling and connections comprising a network -- the shape of the system.
  - Bus, Star, Mesh, Ring, Star
- **Star Topology**
  - Most popular
  - each device has its own cable run connecting the device to a common hub or concentrator. Only one device is permitted to use each port on the hub.



Excellence in Low-Power The way MICOM/DSP should be



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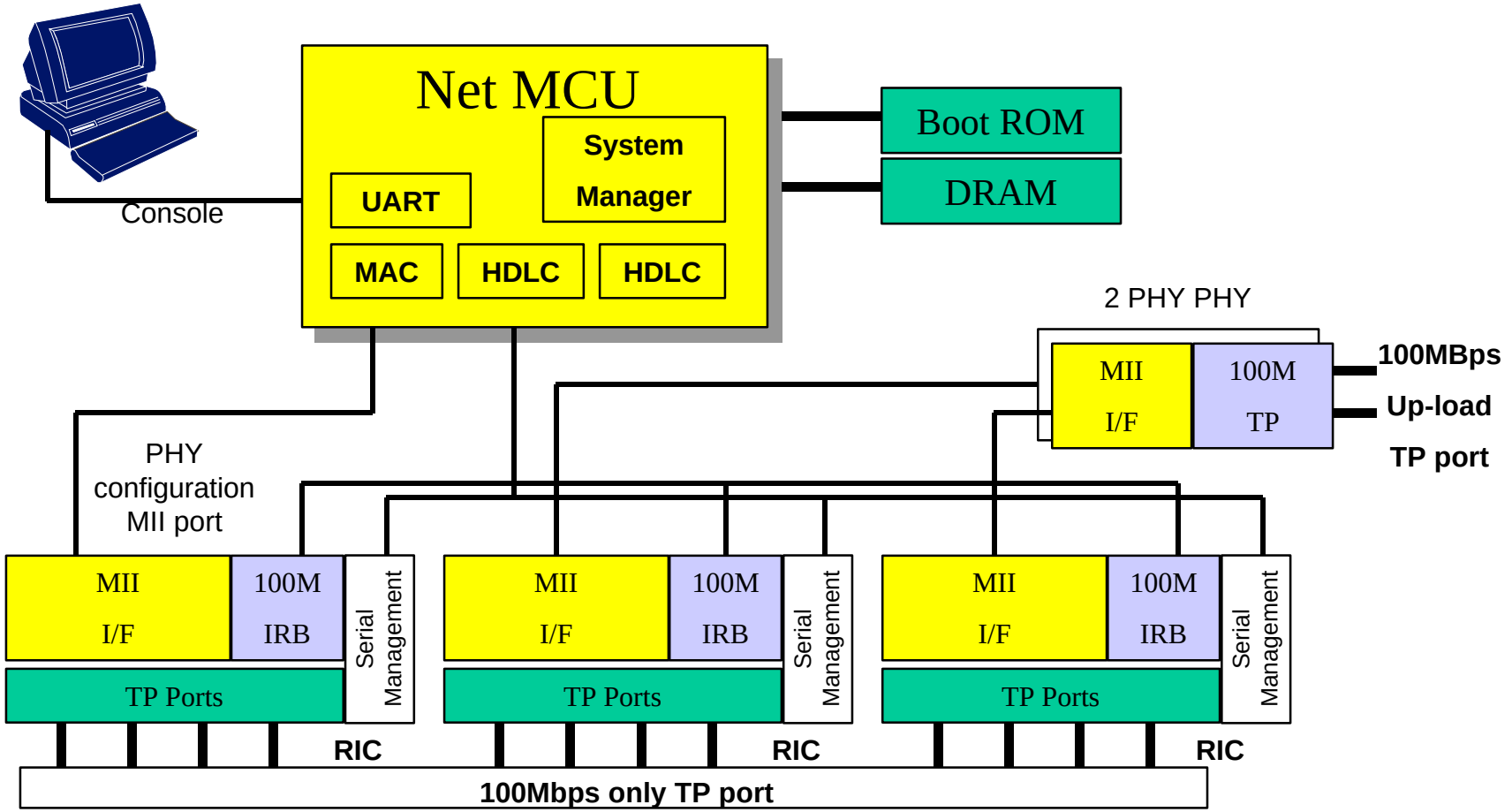

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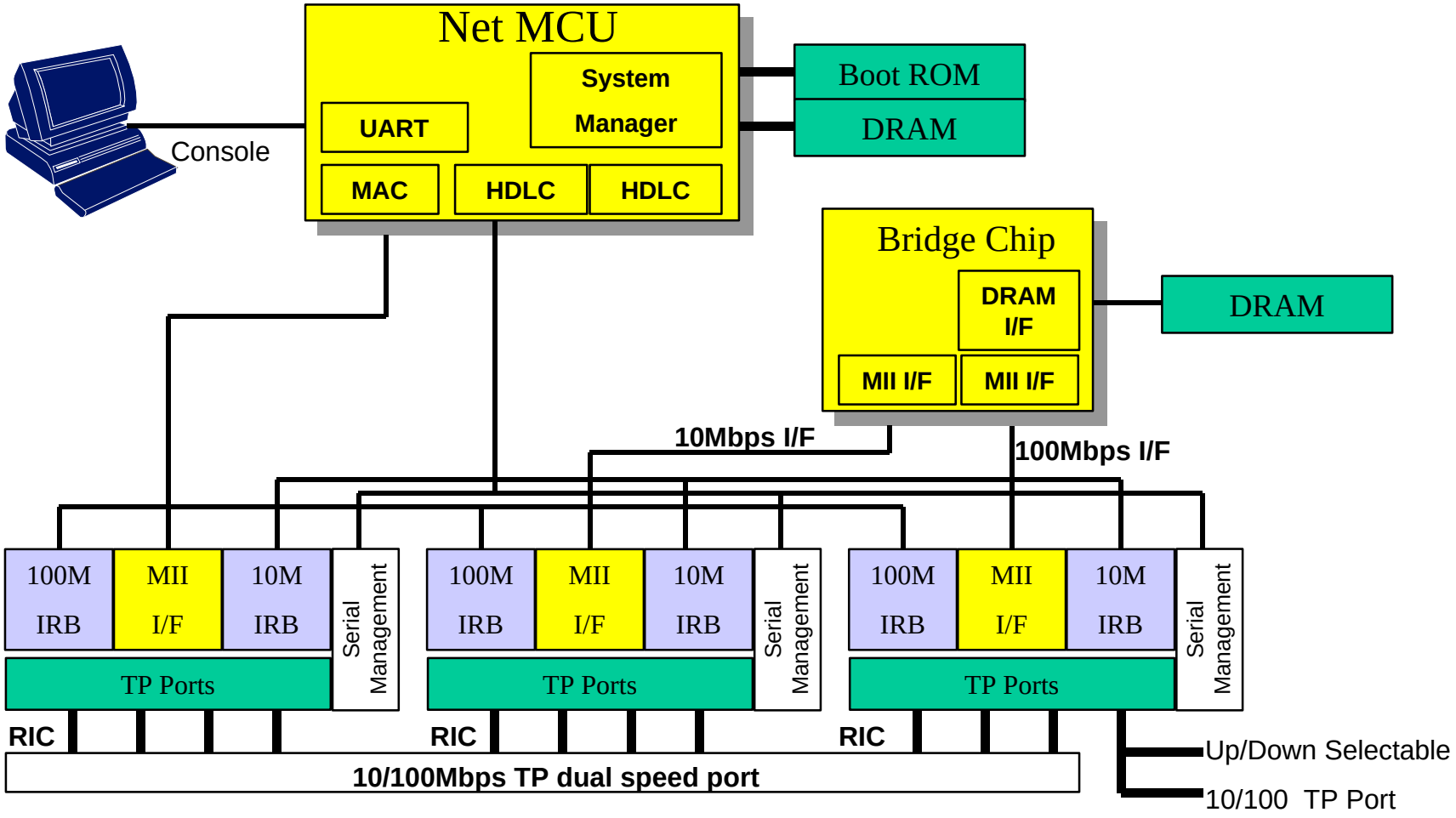

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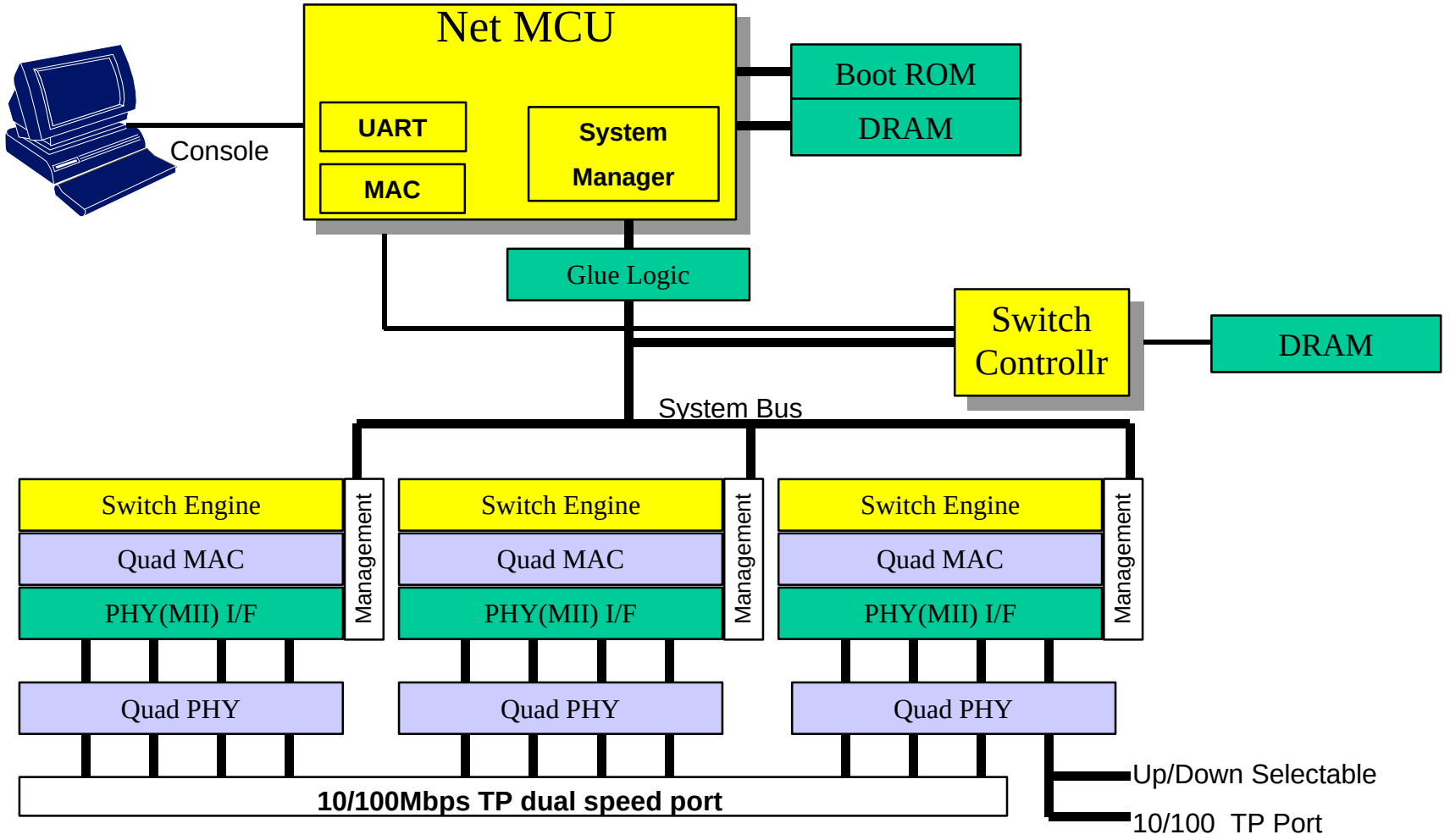

Function

- Multiple LAN users to access the Internet simultaneously, using a single IP address through a 33.6k/56kb or ISDN modems.
- World Wide Web (WWW) for setup with your Router
- Supports BOOTP/DHCP for automatic IP address assignment
- Standard 10/100 BaseT network interface with 4 port HUB.

Software for Router

- TCP/IP stack
  - UDP
  - TCP
  - ICMP
  - ARP/RARP
- Routing Database
- RIP
- DNS resolver
- Packet filtering
- Network Address Translation (NAT)
- PPP (PAP/CHAP/LCP), ML-PPP
- Dynamic/static IP support
- SNMP
- HTTP
- BOOTP/DHCP

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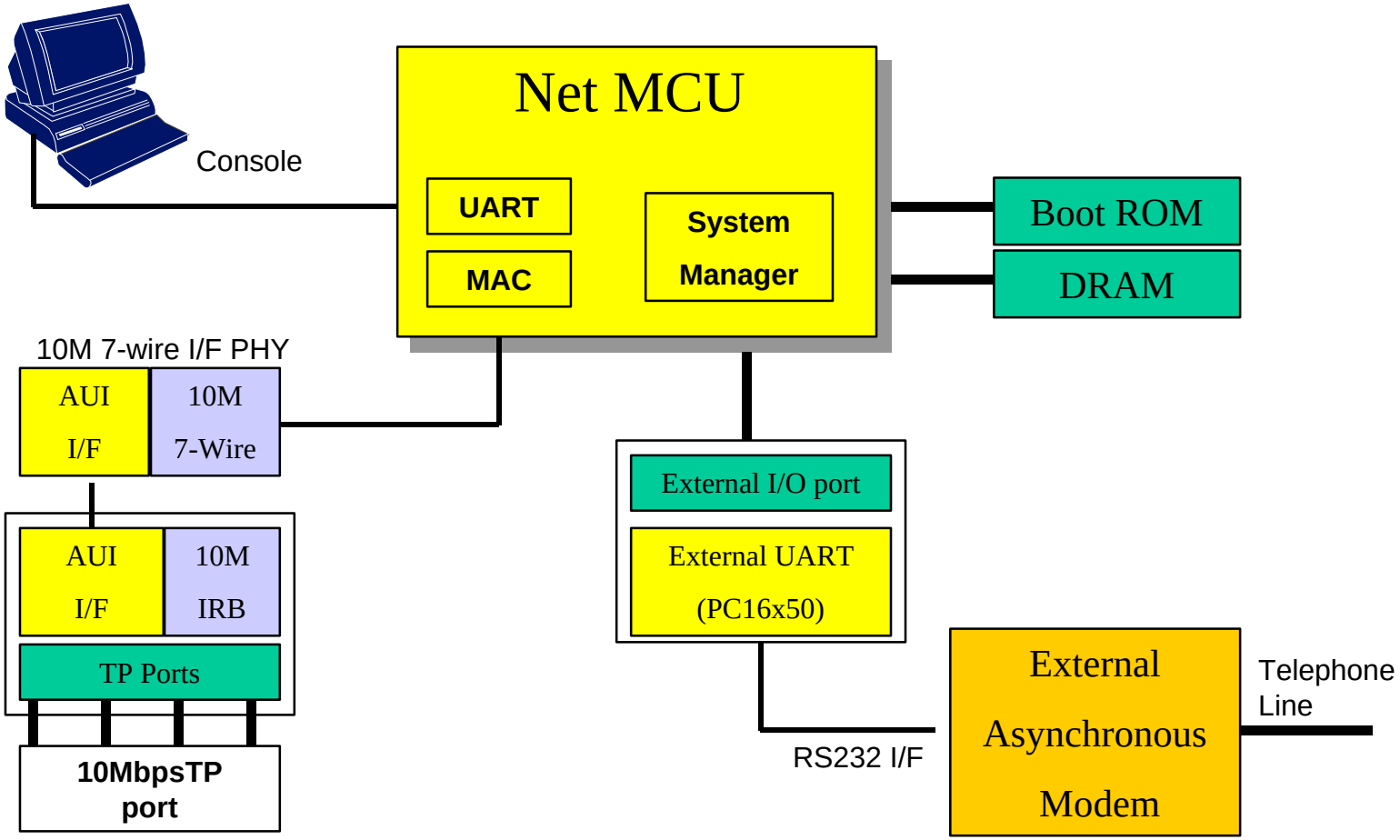

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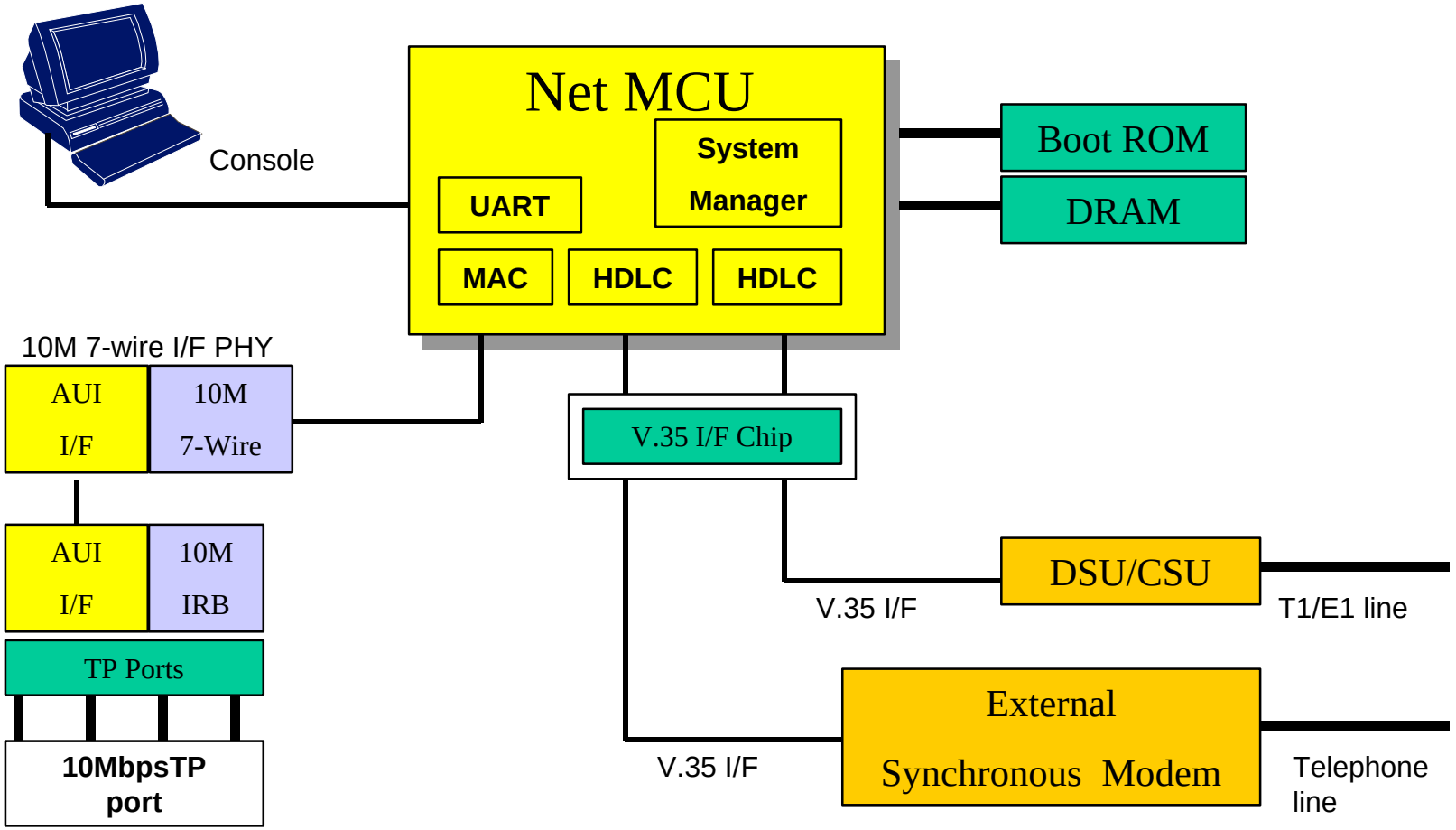

ISDN Reference Model

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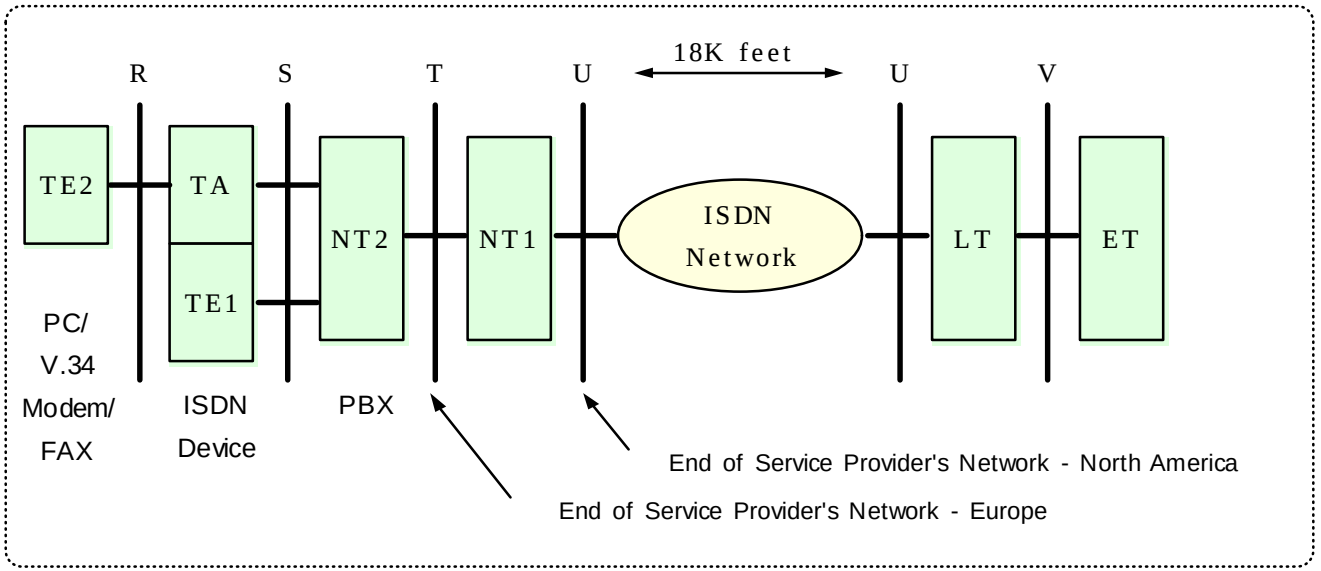

ISDN Reference Point

V : Proprietary interface within Central Office

U : 2-wire Interface up to 18K feets

S/T : 4-wire interface up to 1K meters

R : Any non-ISDN interface (RS-232, V.34)

ISDN Reference Equipment

LT(Line Termination) : C.O Switch or Remote line card

NT1/NT2(Network Termination) : CPE connection to network

TE1(Terminal Equipment type 1) : ISDN compatable terminal

TE2(Terminal Equipment type 2) : Non-ISDN terminal

TA (Terminal Adapter) : Interface for non-ISDN terminal

ISDN Reference Design (BRI)

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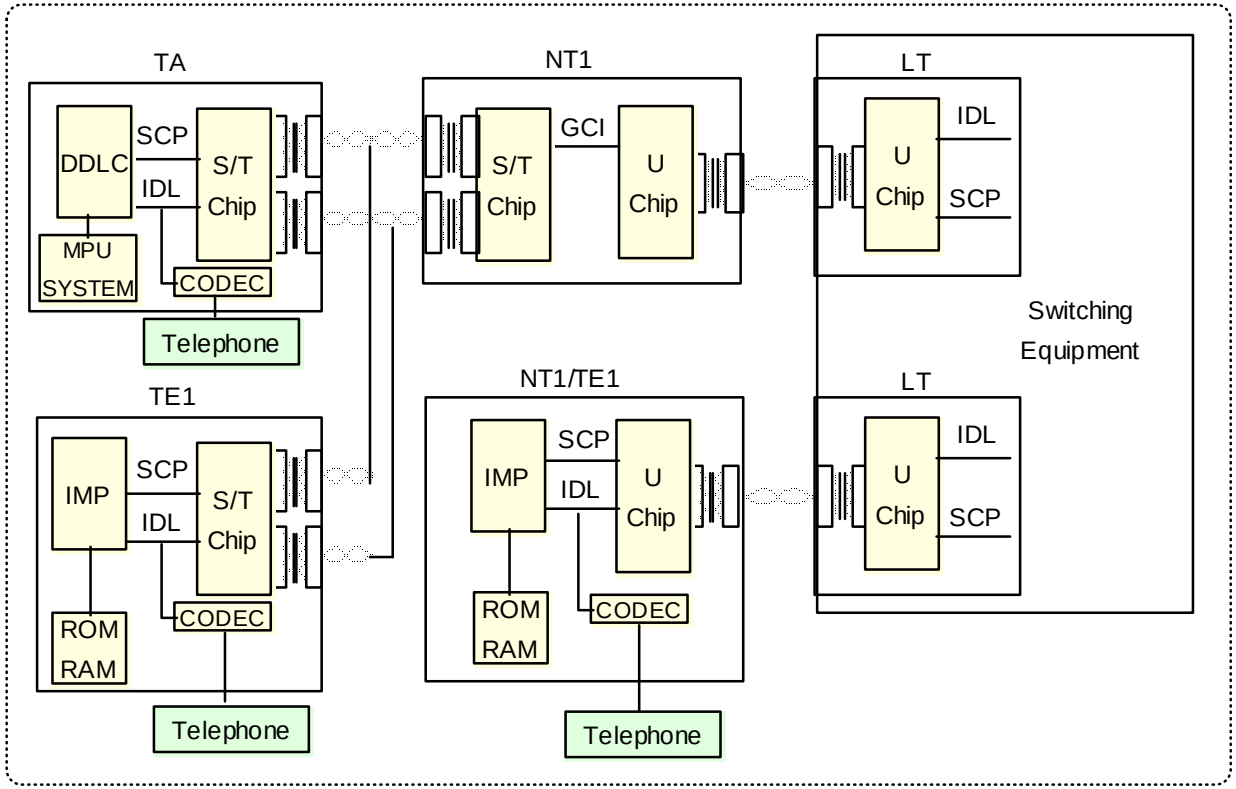

IMP : Integrated Multiprotocol Processor

IDL : Motorola Interchip Digital Link

SCP : Serial Communication Port

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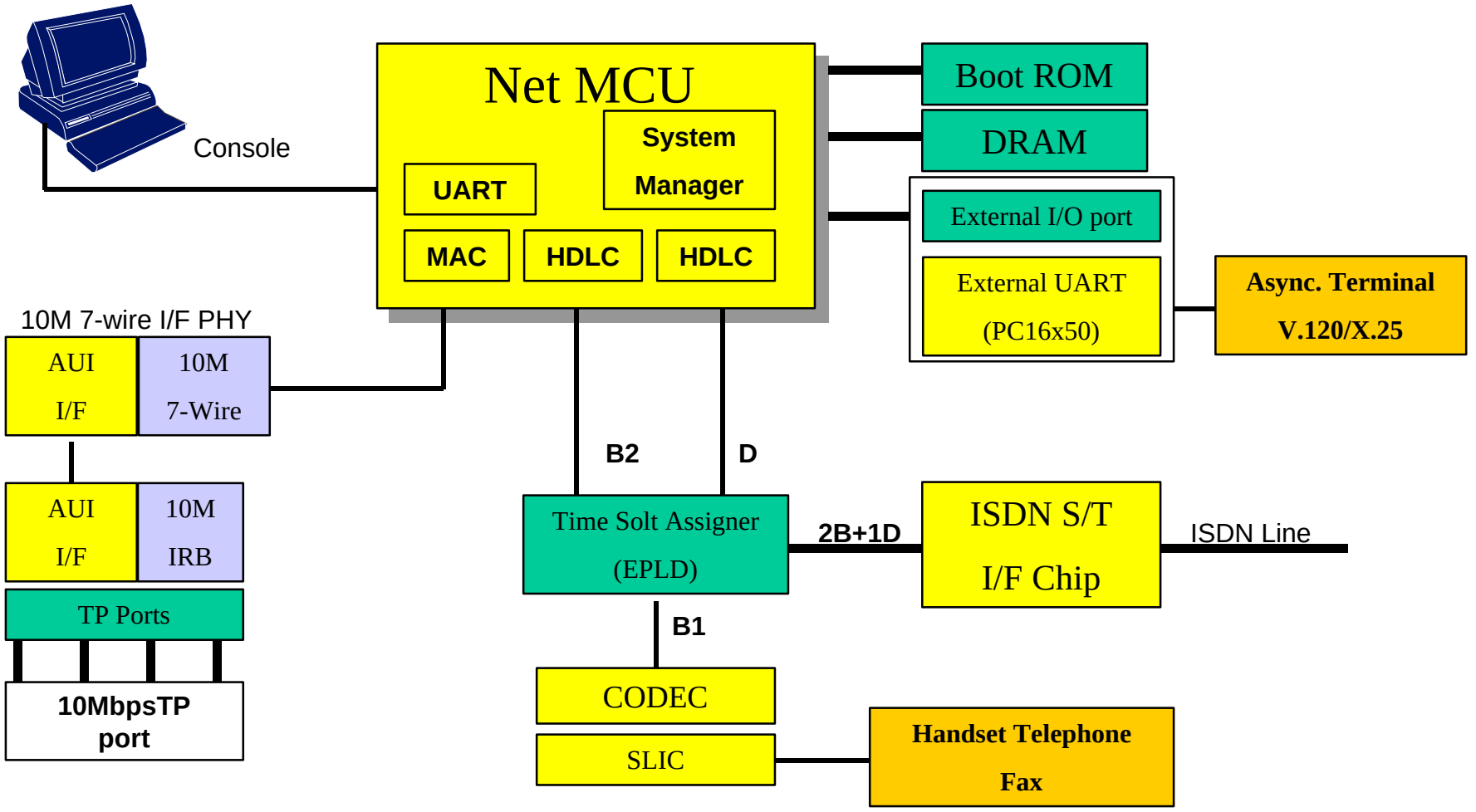

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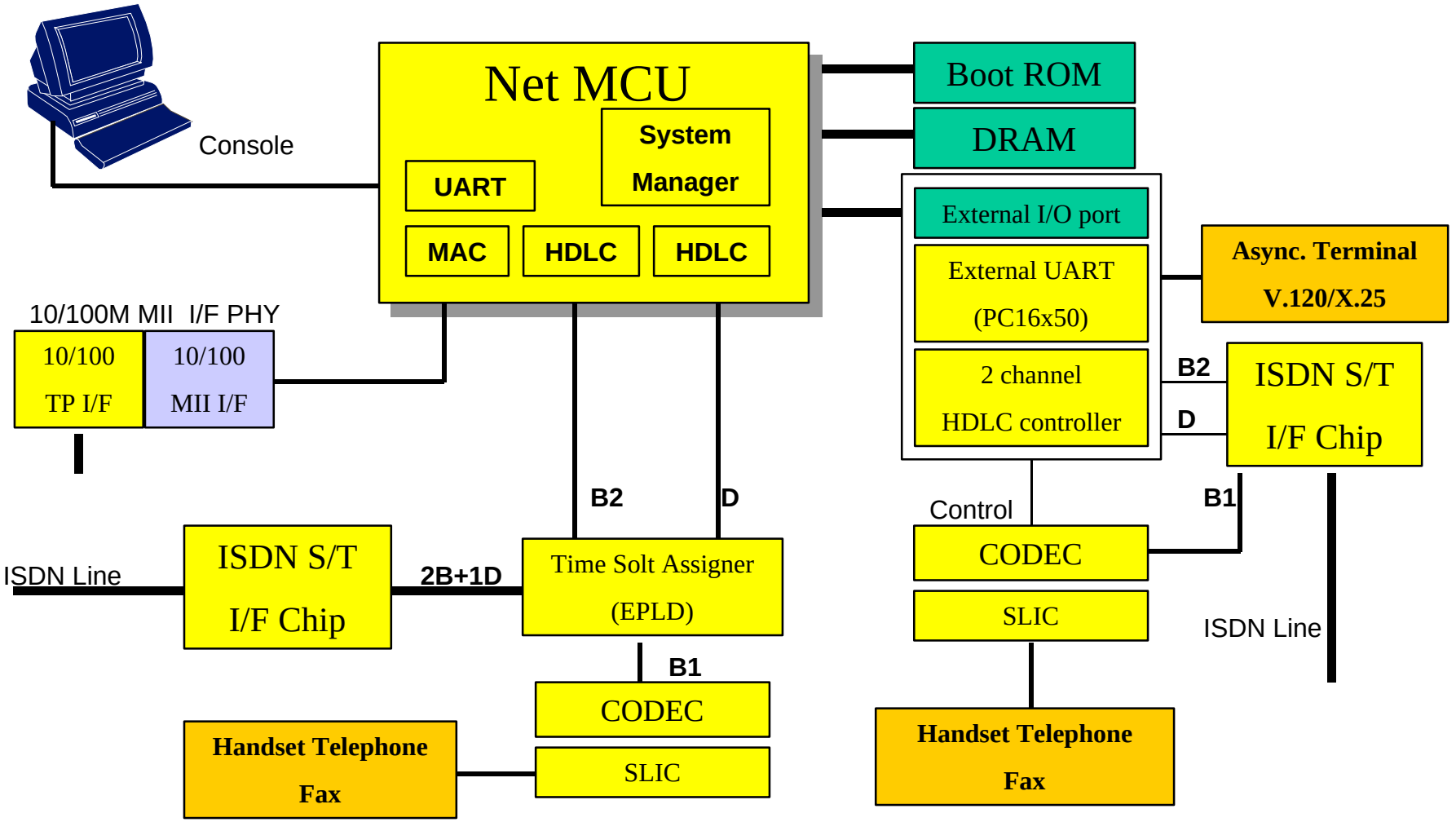
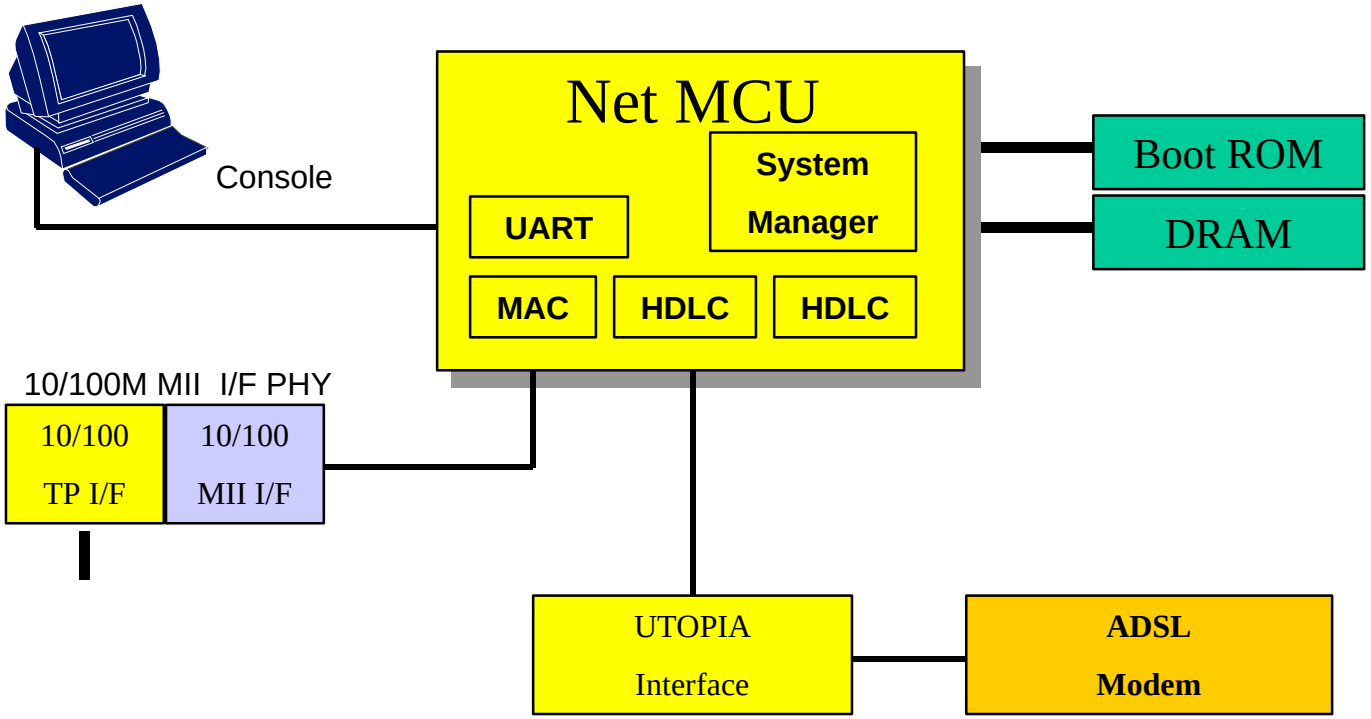
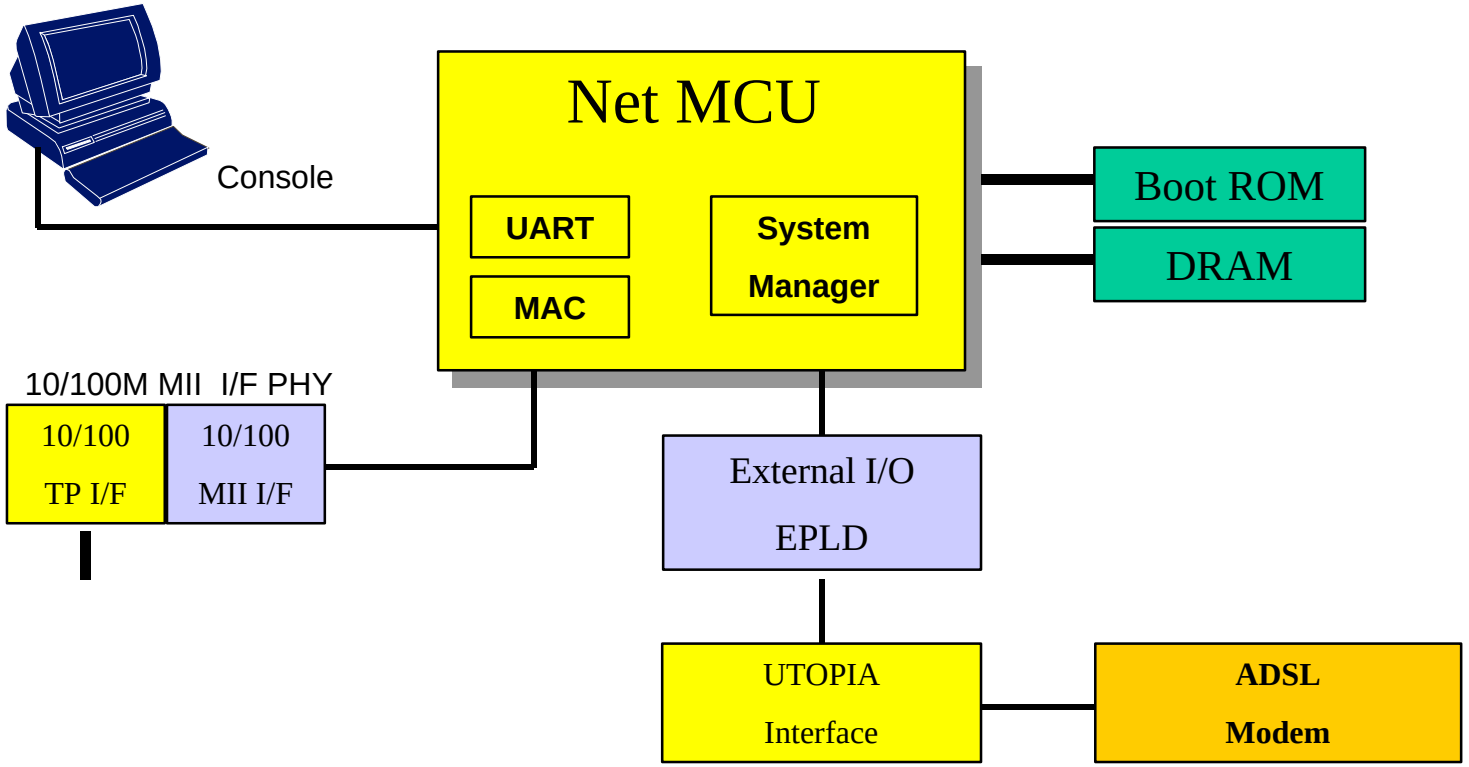
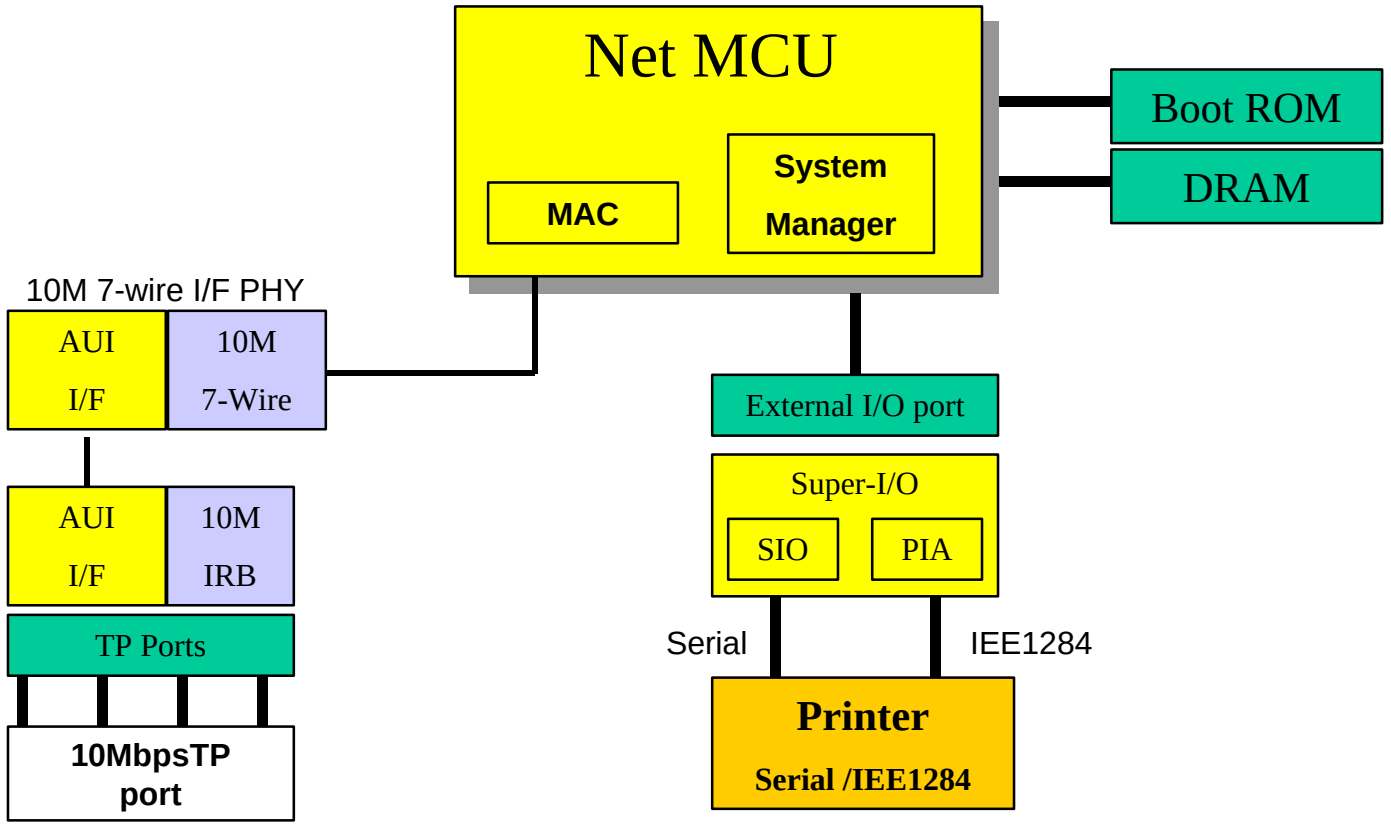



Net MCU
System Manager
UART
MAC
HDLC
HDLC
Console
Boot ROM
DRAM
10/100M MII I/F PHY
10/100 TP I/F
10/100 MII I/F
UTOPIA Interface
ADSL Modem

Excellence in Low-Power The way MICOM/DSP should be




Net MCU
MAC
System Manager
Boot ROM
DRAM
10M 7-wire I/F PHY
AUI I/F
10M 7-Wire
AUI I/F
10M IRB
TP Ports
10MbpsTP port
External I/O port
Super-I/O
SIO
PIA
Serial
IEE1284
Printer
Serial /IEE1284

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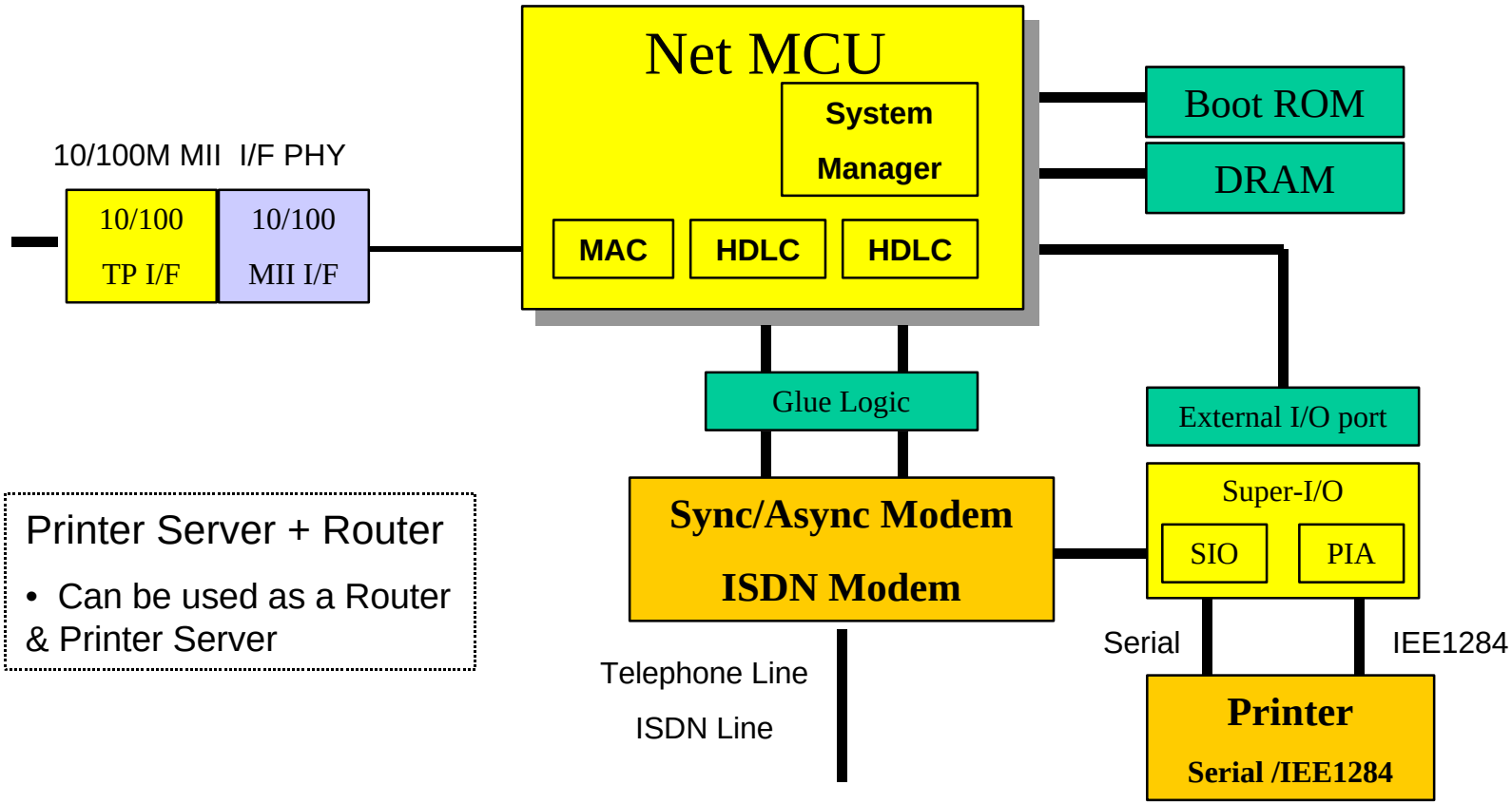

Printer Server + Router

- Can be used as a Router & Printer Server

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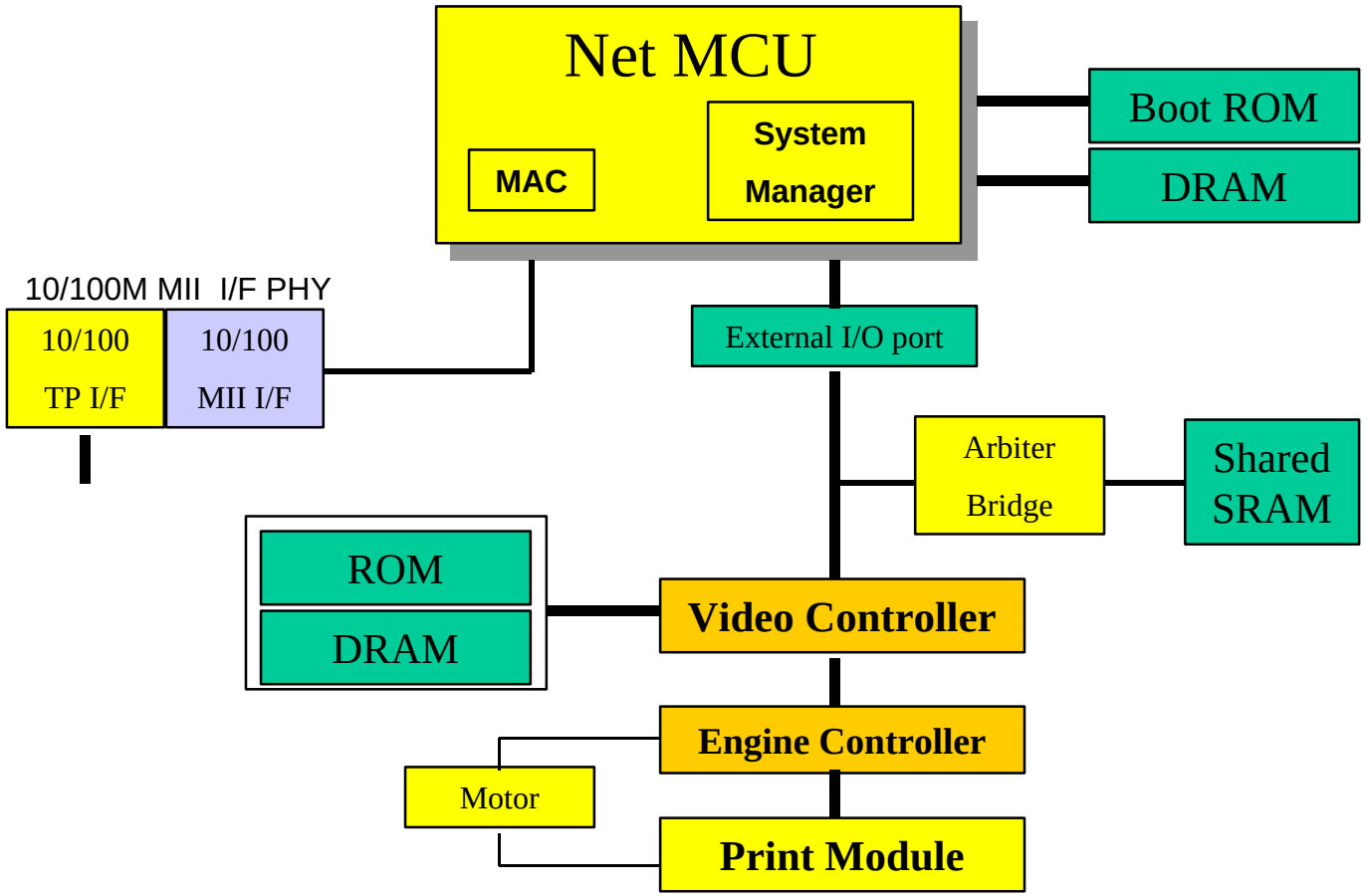

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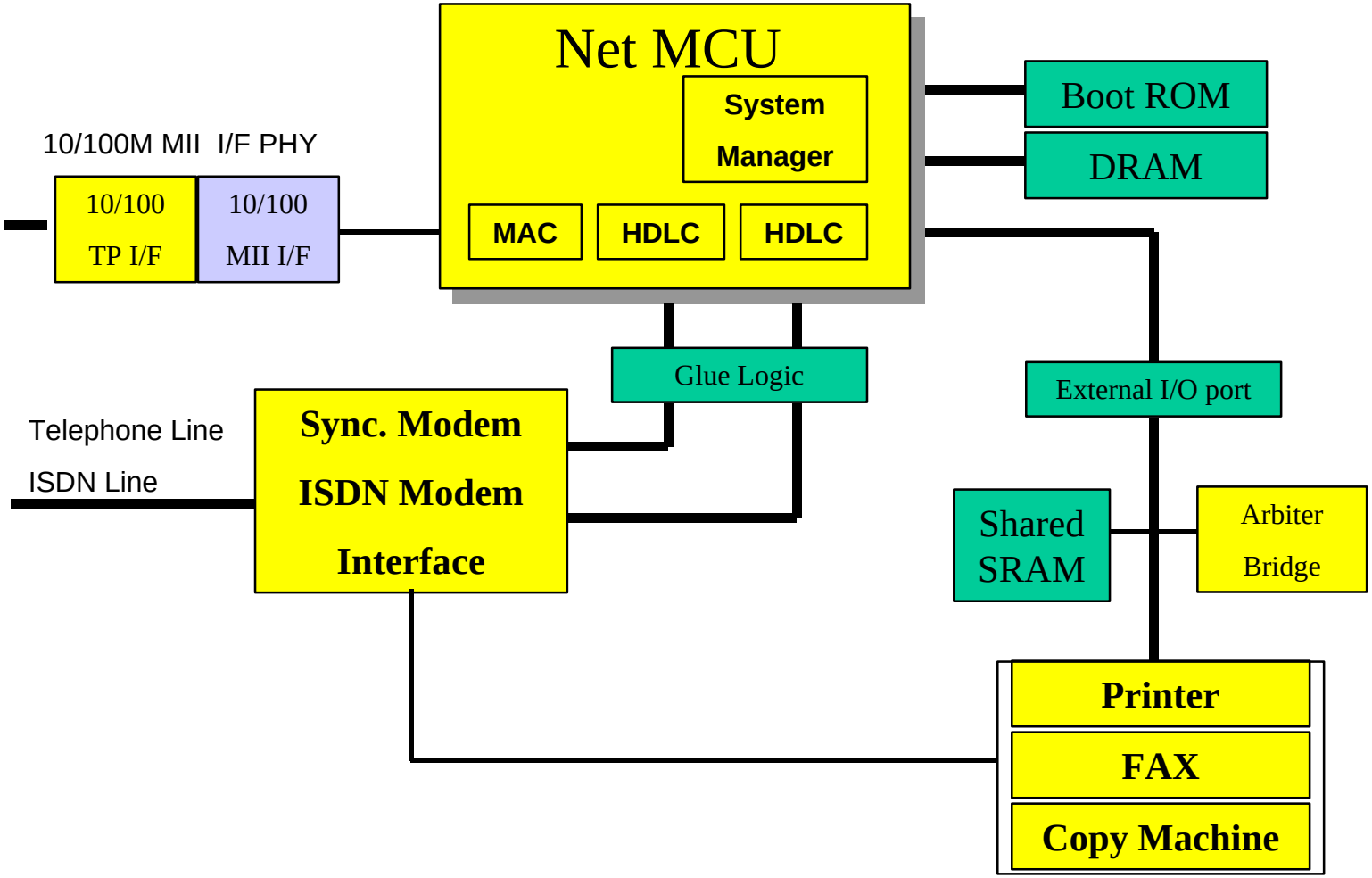

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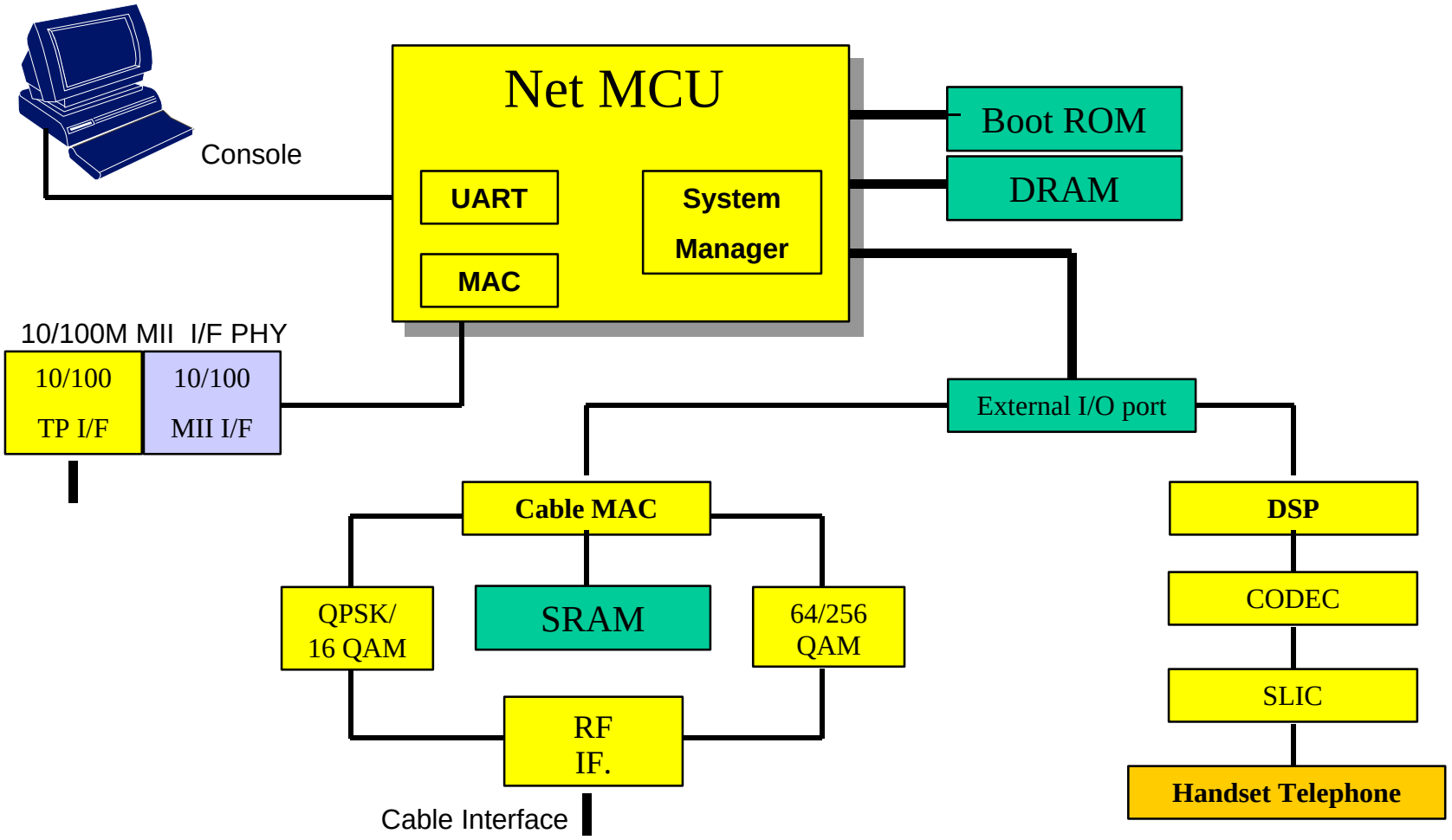

UPS Management Controller

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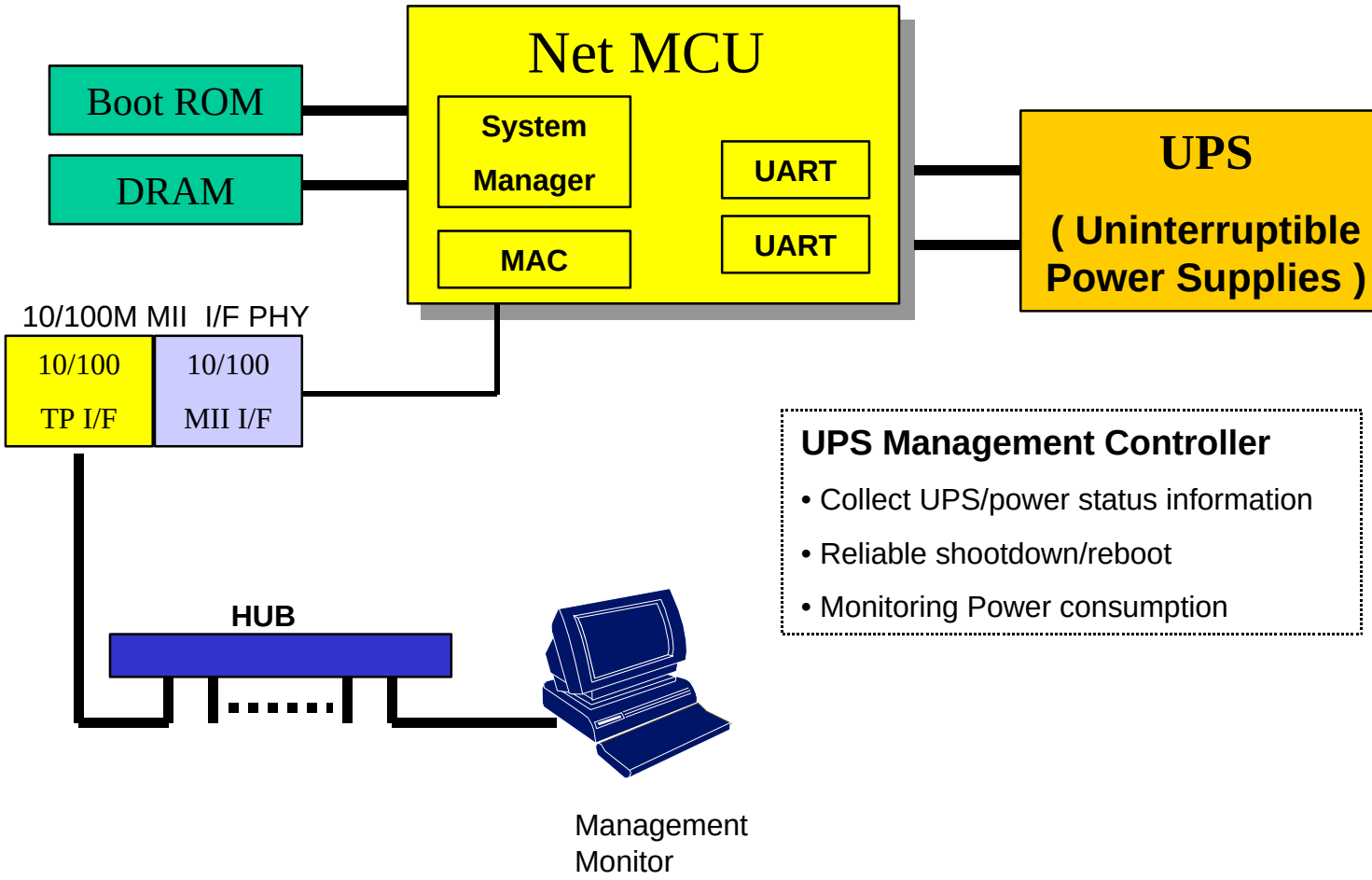

UPS Management Controller

- Collect UPS/power status information
- Reliable shootdown/reboot
- Monitoring Power consumption