



STM32 Connectivity Line

Ethernet & TCP/IP introduction

2009年STM32 全国研讨会

北京、深圳、上海、台北、
青岛、重庆、南京、哈尔滨、
武汉、福州、西安

STM32F107 Ethernet

Generic information about TCP-IP

Nichelite TCP-IP Stack

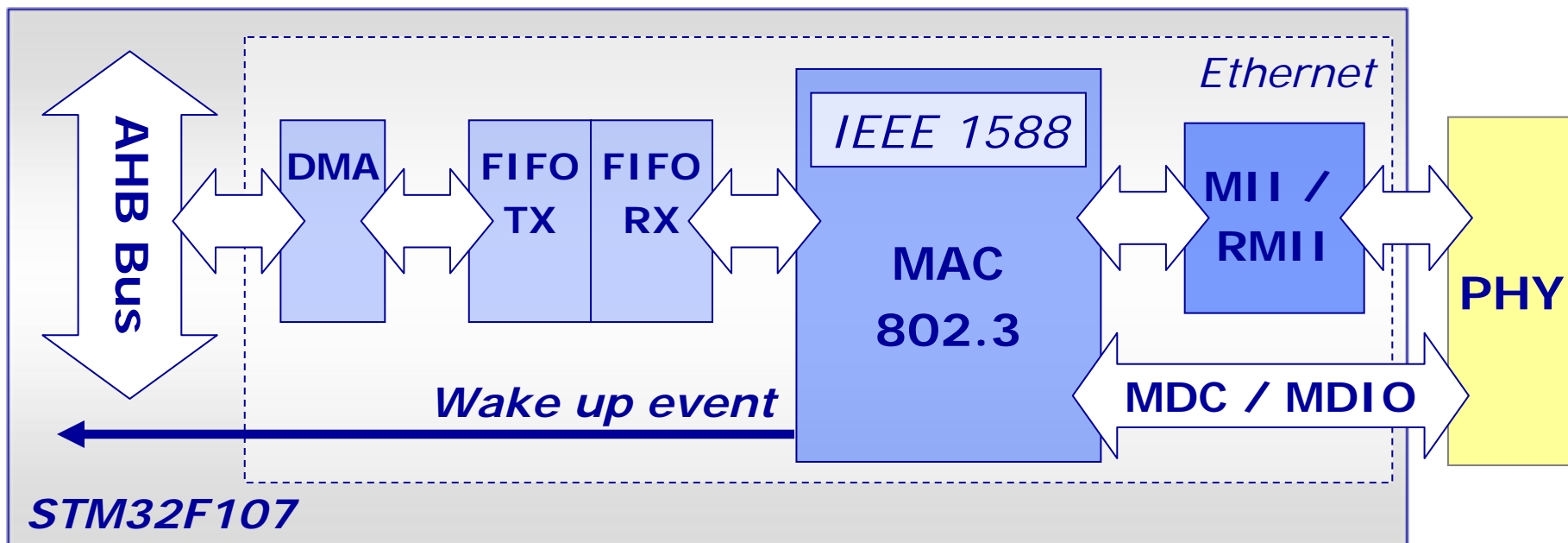
Application Examples



The STM32F107 MAC block diagram

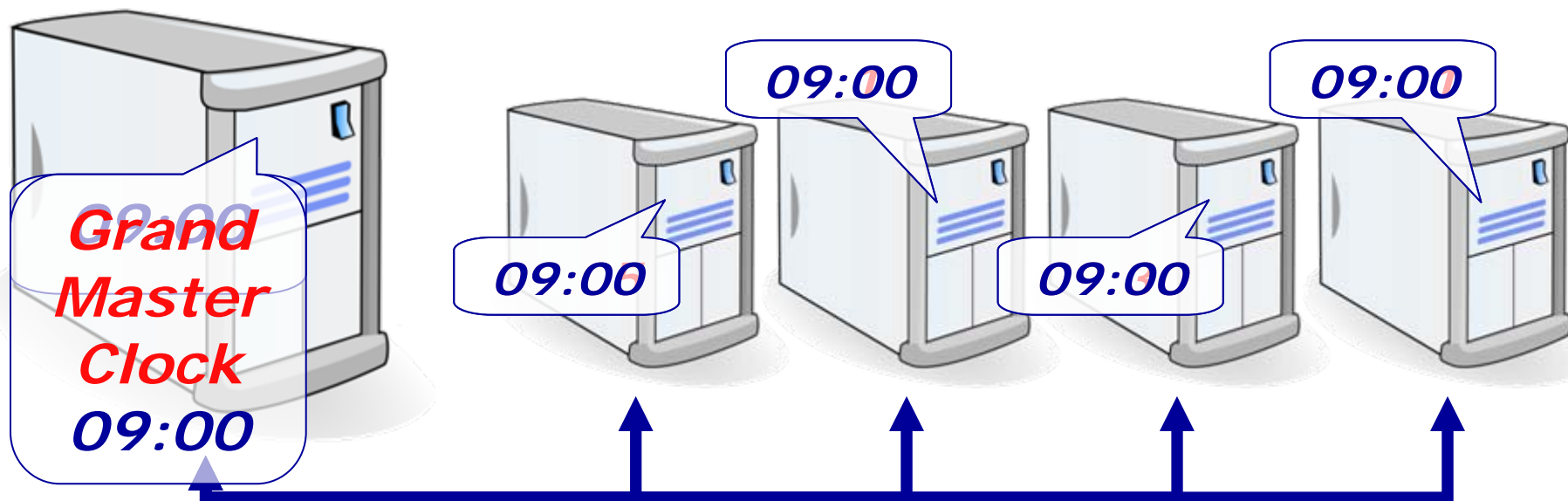


- Configurable and flexible MAC 802.3
- Support two industry standard interfaces for the PHY
 - Media Independent Interface (MII)
 - Reduced Media Independent Interface (RMII)
- Integrated DMA controller
- Hardware support of IEEE 1588
- Ethernet wakeup event



- It is a protocol designed to synchronize real-time clocks of the devices of a network
- Synchronization is done with the most accurate clock found in a packet-based network: called the **Grand Master Clock**.
- **Accuracy is Sub- μ second**

Detailed PTP description





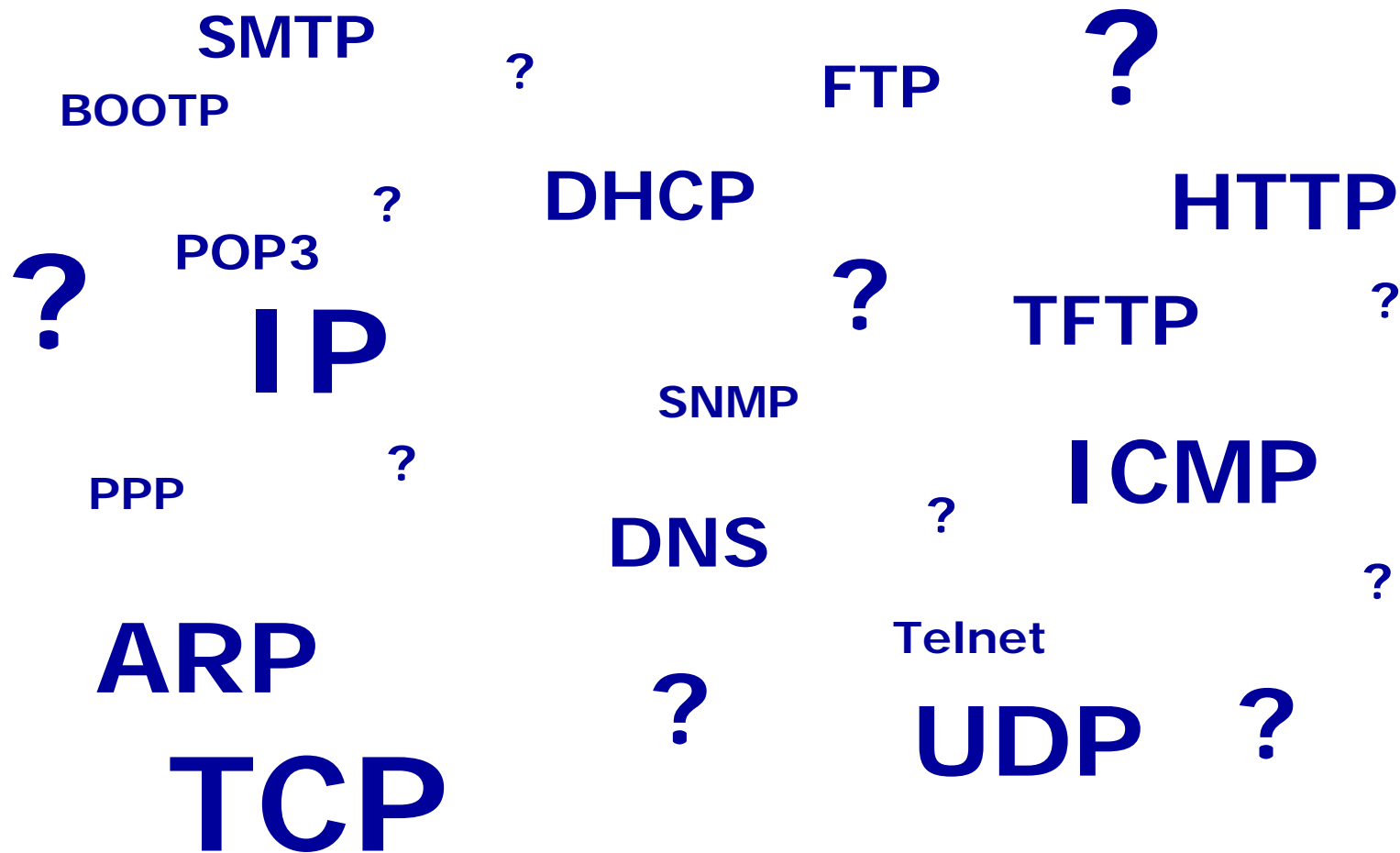
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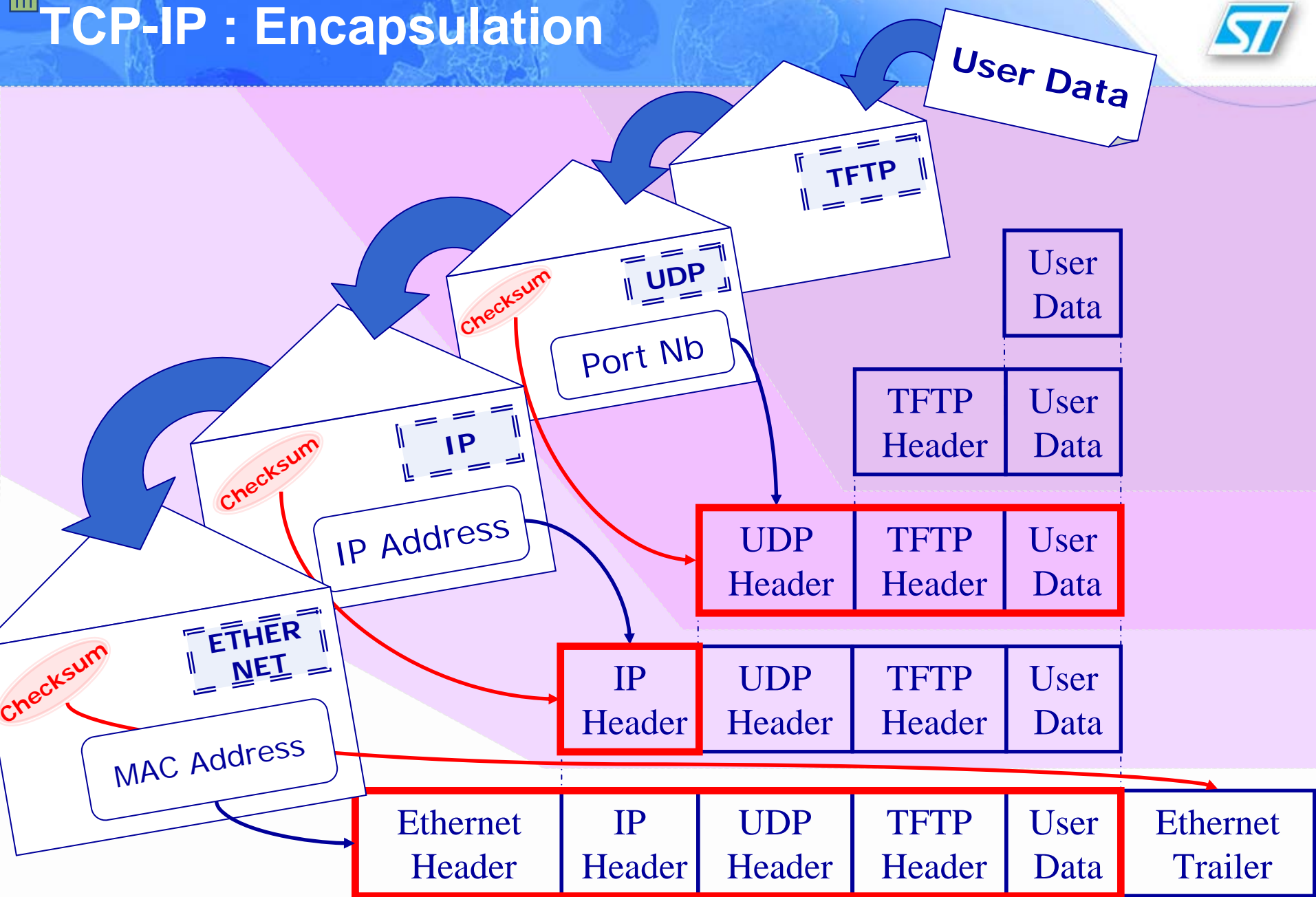


TCP-IP : A layered protocol stack

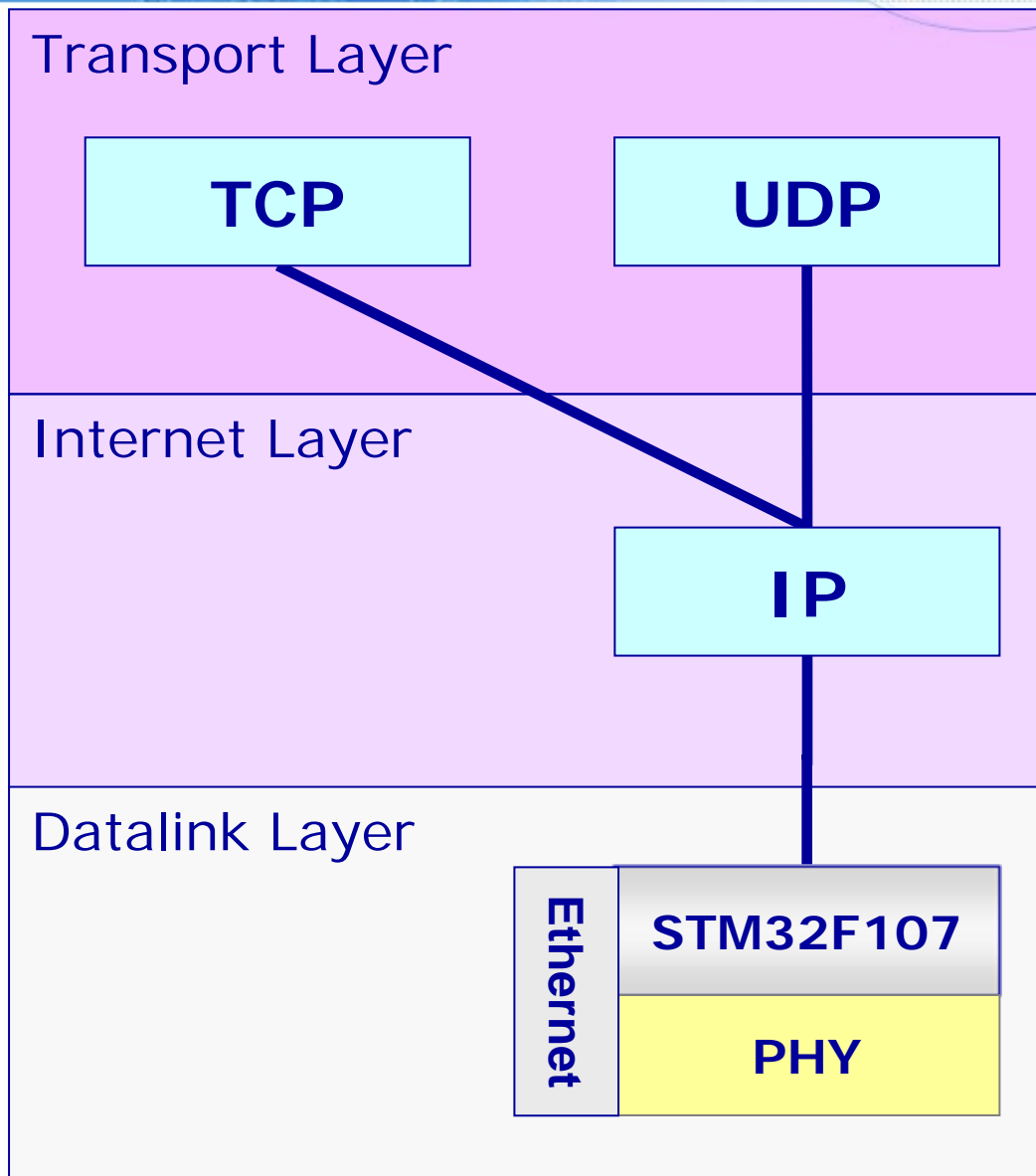
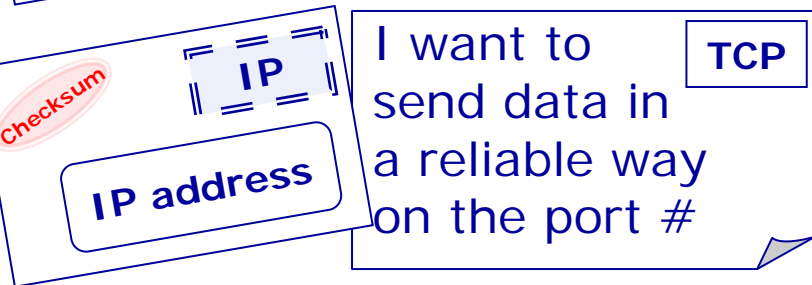


Application Layer	<ul style="list-style-type: none">• The main interface for the user.• Higher level protocols
Transport Layer	<ul style="list-style-type: none">• End-to-end connections (UDP and TCP)• Ensure reliability (TCP)
Internet Layer	<ul style="list-style-type: none">• Intra & Inter-Network communication• no guaranty of delivery
Data link Layer	<ul style="list-style-type: none">• Intra-Network communication• Transport data on the physical support

TCP-IP : Encapsulation

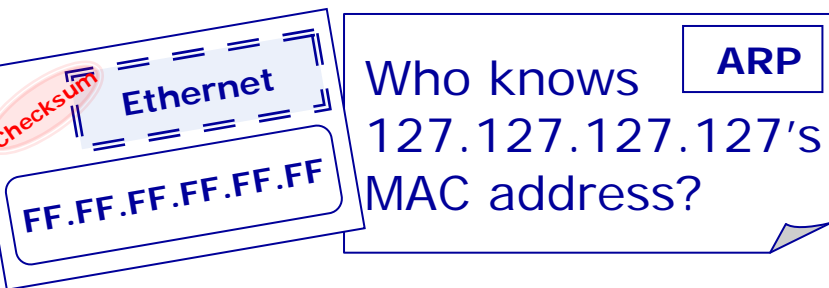


TCP-IP : Key Protocols

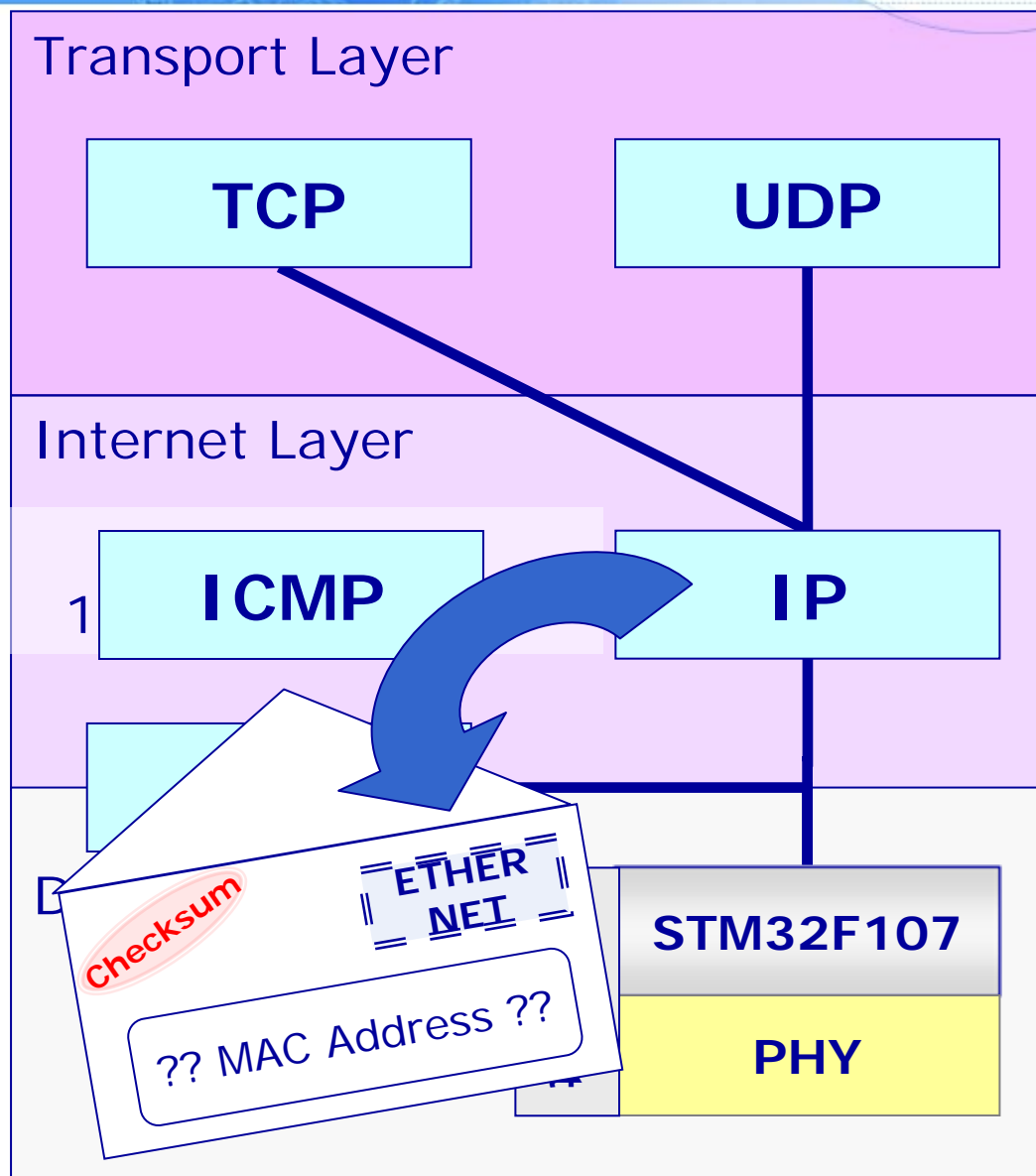
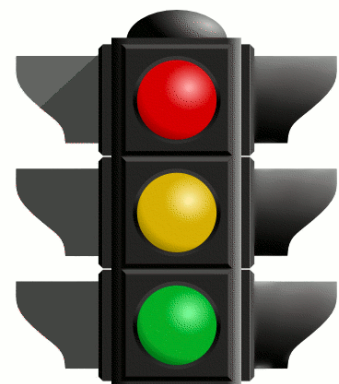


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Click on the "letter"
to get a detailed
description

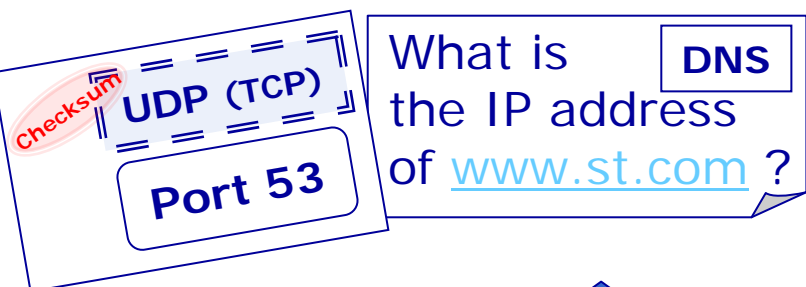
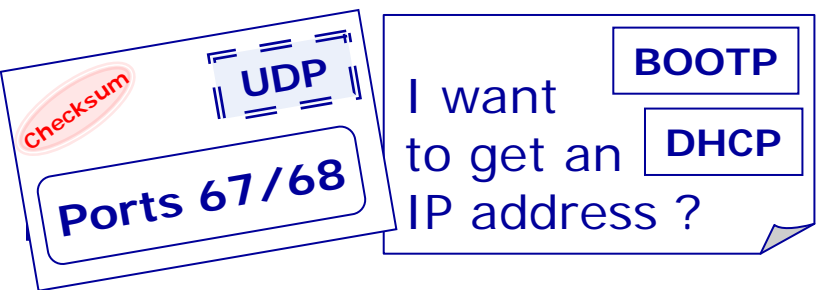
TCP-IP : Key Protocols



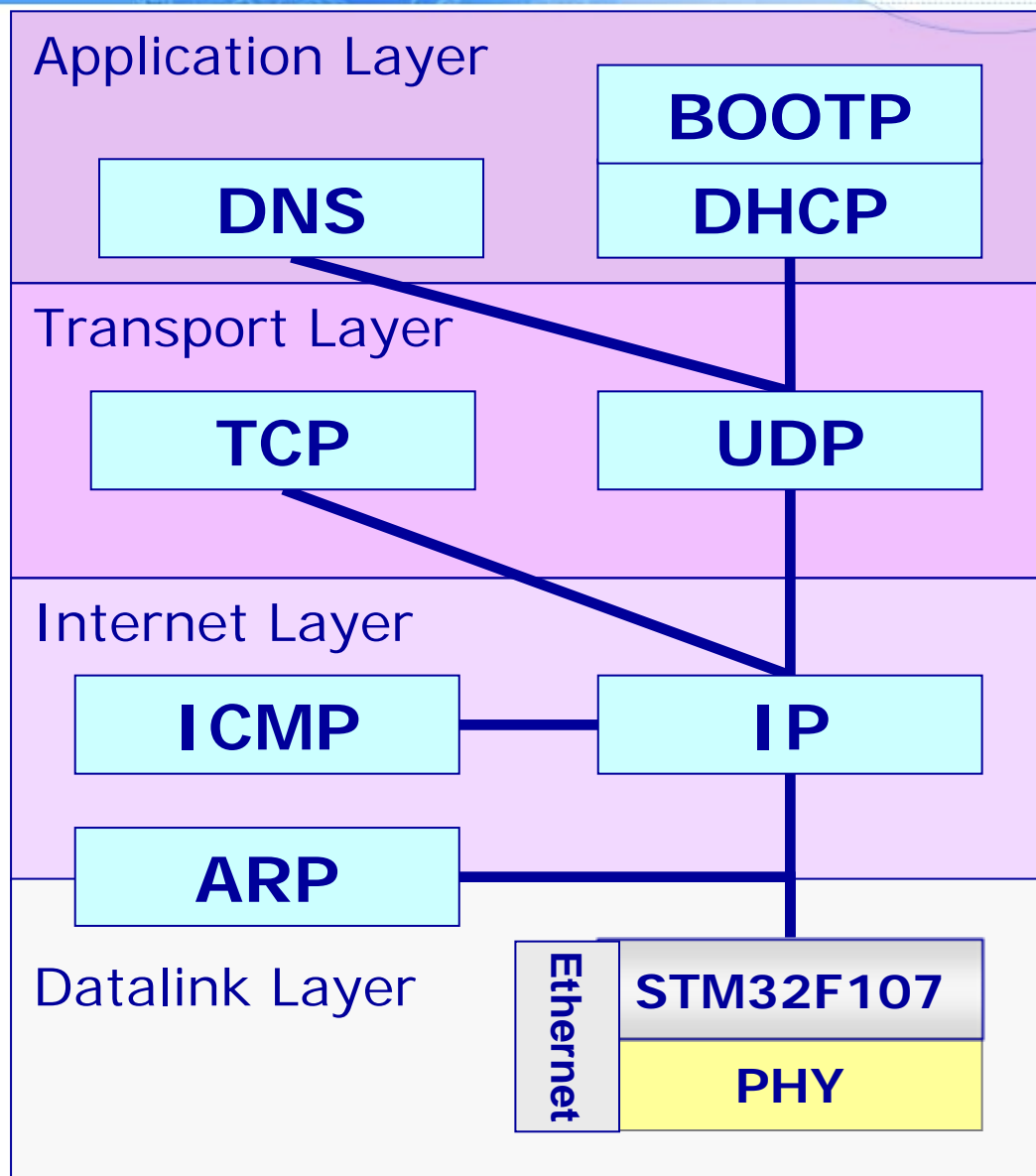
Click on the "letter" to get a detailed description



TCP-IP : Key Application layer protocols



Click on the "letter"
to get a detailed
description



Application layer protocols



World Wide Web

Checksum TCP
Port 80

I want HTTP this resource.



Terminal connection

Checksum TCP
Port 23

I want Telnet a terminal connection.



Network Management

Checksum UDP
Ports 161/162

I want to manage my network. SNMP



Email

Checksum TCP
Port 25

I want to SMTP send an email

Checksum TCP
Port 110

I want to POP3 get my emails.



Files Transfer

Checksum UDP
Port 69

I want to TFTP transfer files.

Checksum TCP
Ports 20/21

I want to FTP transfer files

Application layer protocols



World Wide Web



File Transfer



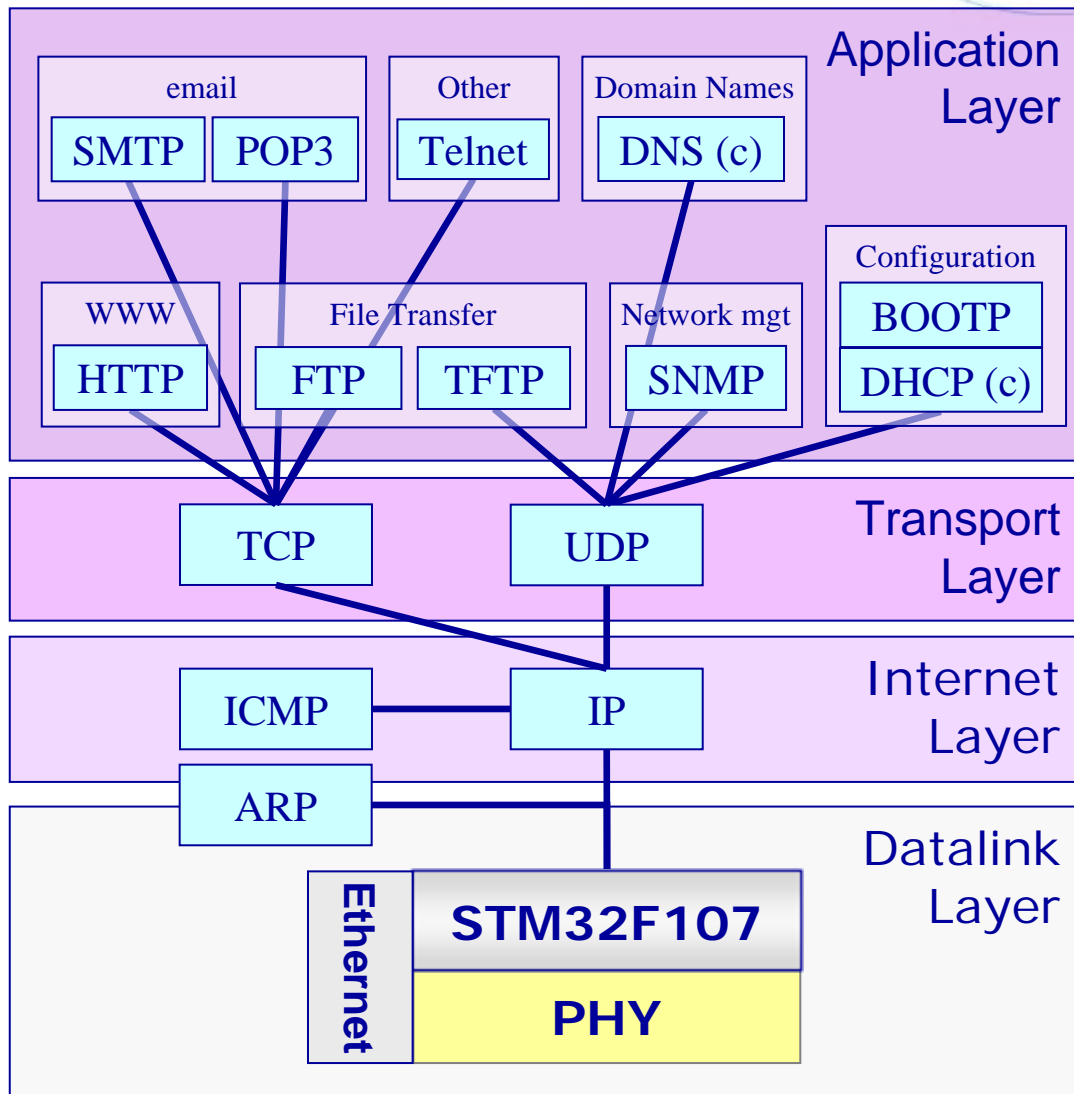
Email



Terminal connection



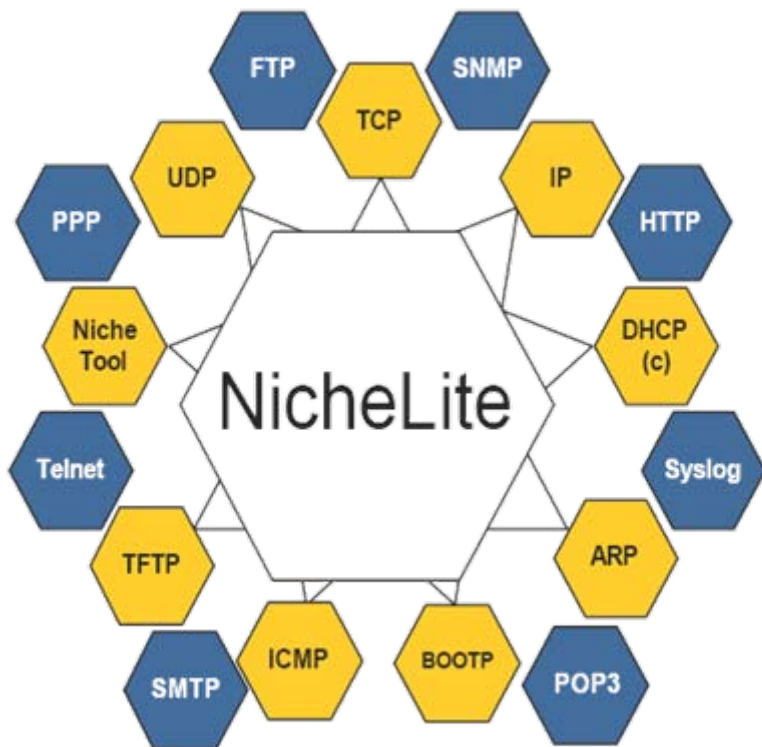
Network Management





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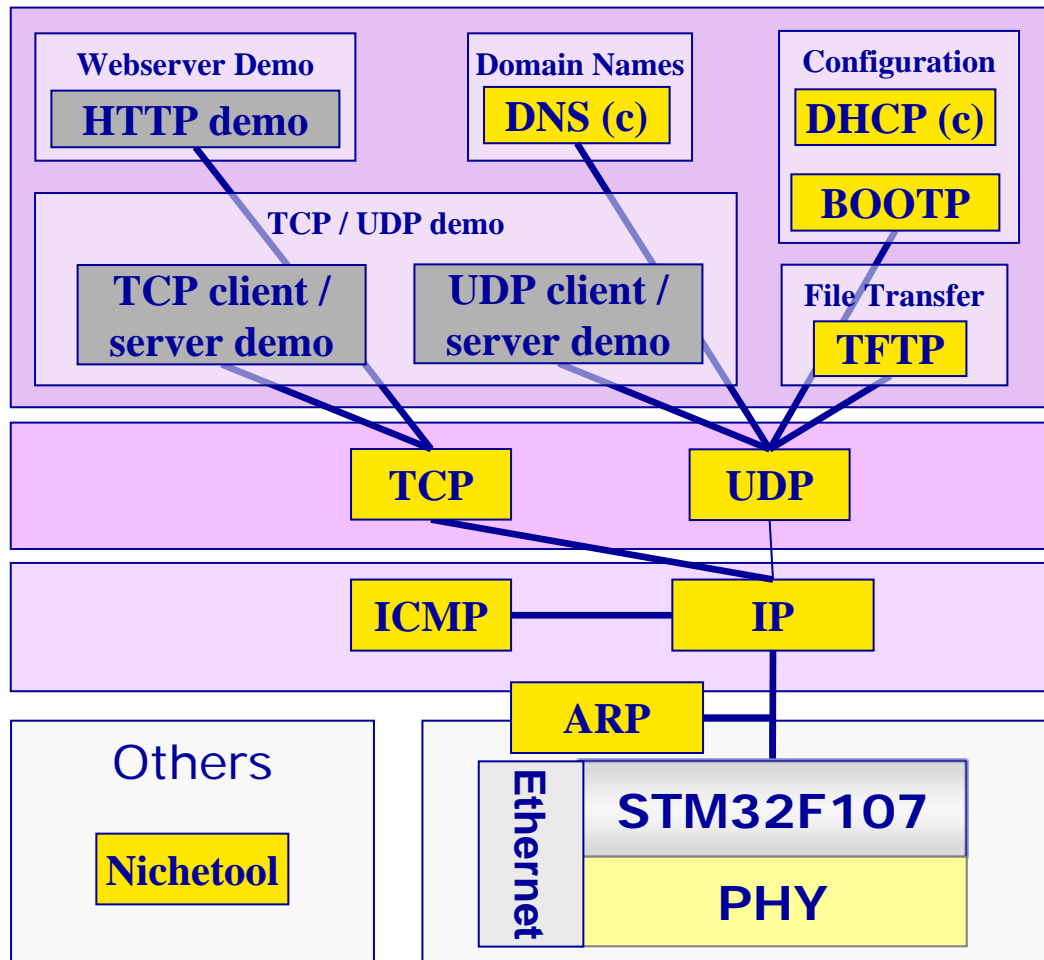




- Included
- Optional
- Demos

Other solutions

Free Package from ST Source code available



Free Package from ST

*See Application Note
AN3000 on our website
for a detailed description
of the Package*

www.st.com/stm32





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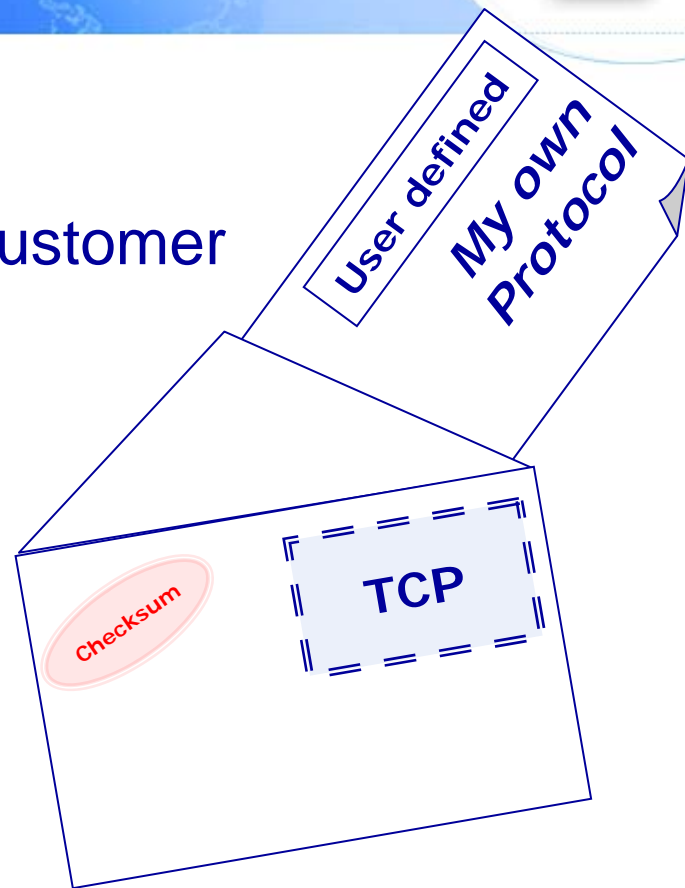


Hardware Requirements

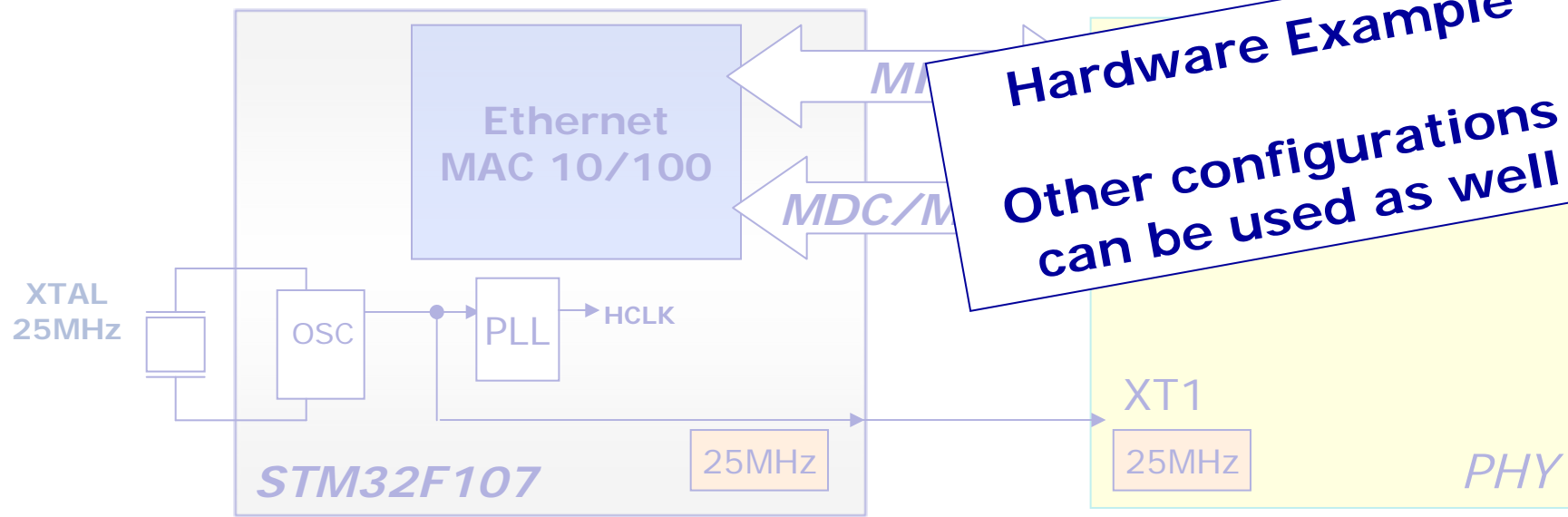
- Use a MII PHY already qualified by customer
- Minimize the BOM cost

Software Requirements

- The customer has its own protocol
- Data is similar a stream of bytes :
 - Lost packets need to be resent
 - Packets need to be ordered
- Lost data / data reordering is not handled by the protocol



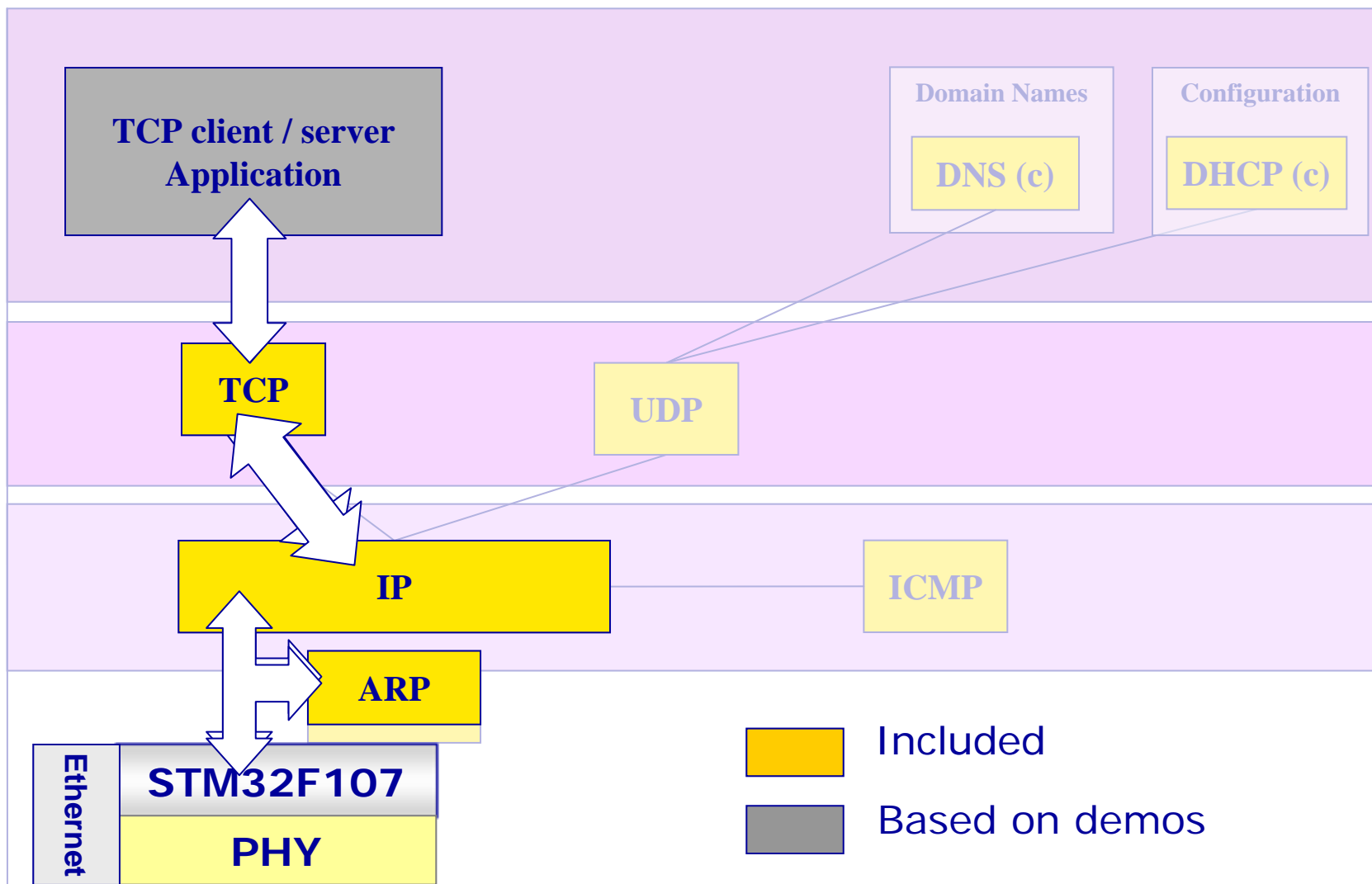
Example 1 : Ethernet Block Diagram



Hardware Example
Other configurations can be used as well

- One 25Mhz external crystal (internal oscillator)
- MII interface
 - 15 pins for the communication between the MAC & PHY
 - 2 pins for the MDC / MDIO (to access PHY registers)

Example 1 : user defined protocol over TCP-IP



Example 2 : Firmware upgrade

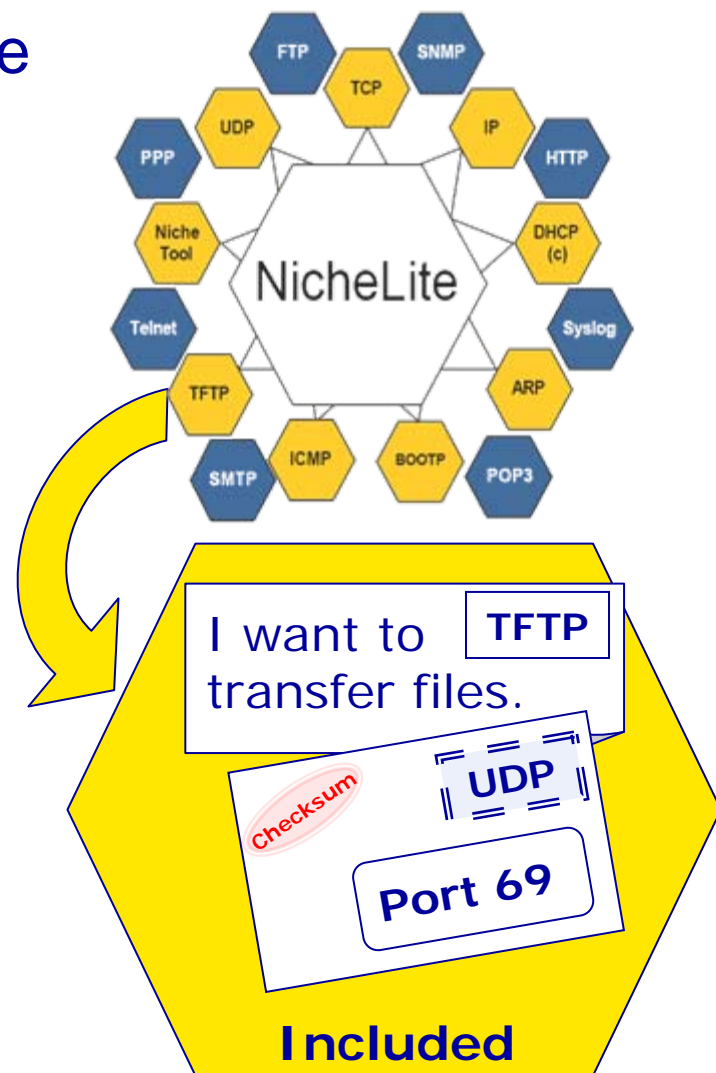


Hardware Requirements

- Use RMII to optimize the GPIO usage
- Reduce the BOM cost

Software Requirements

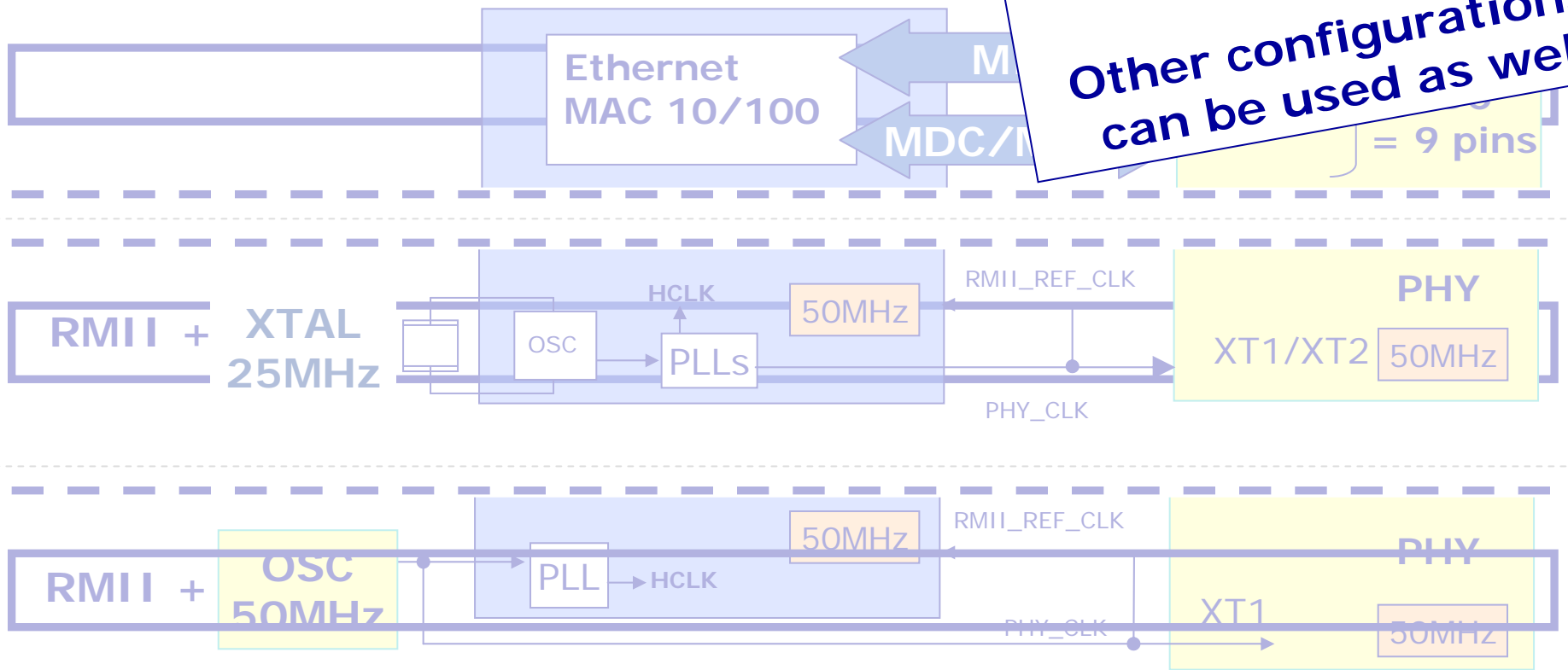
- Need a commercial solution
- Need a cost effective solution
- Need the source code
- Using a simple protocol
- Reliable protocol



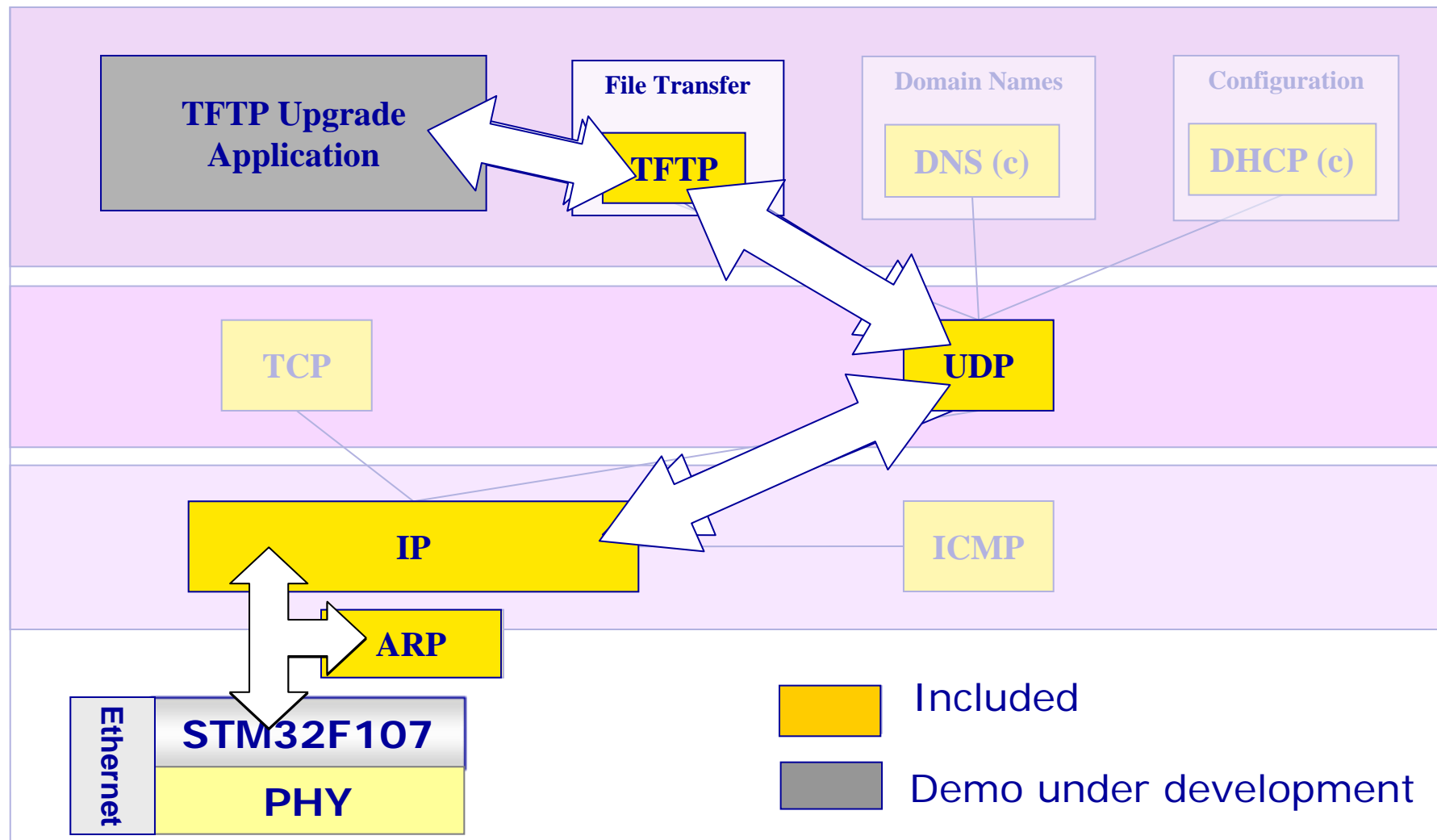
Example 2 : Ethernet Block Diagram

- RMI interface (RMI + MDC/MDIO = 9 pins)
- One 25Mhz external crystal
- Or one 50Mhz external oscillator

Hardware Examples
Other configurations can be used as well



Example 2 : Firmware upgrade



The STM32F107 is a product with advanced features

- IEEE1588 support
- MAC IP designed for performances

The STM32F107 is a flexible product :

- RMII and MII connection available on all the packages
- The customer can use his preferred PHY
- Minimum external HW required

ST offers a effective Hardware & Software solution

- NicheLite stack available for download with the Key Protocols and demo to start quickly
- Source code of the stack provided
- www.st.com/stm32

Thank You