



# Real Time College

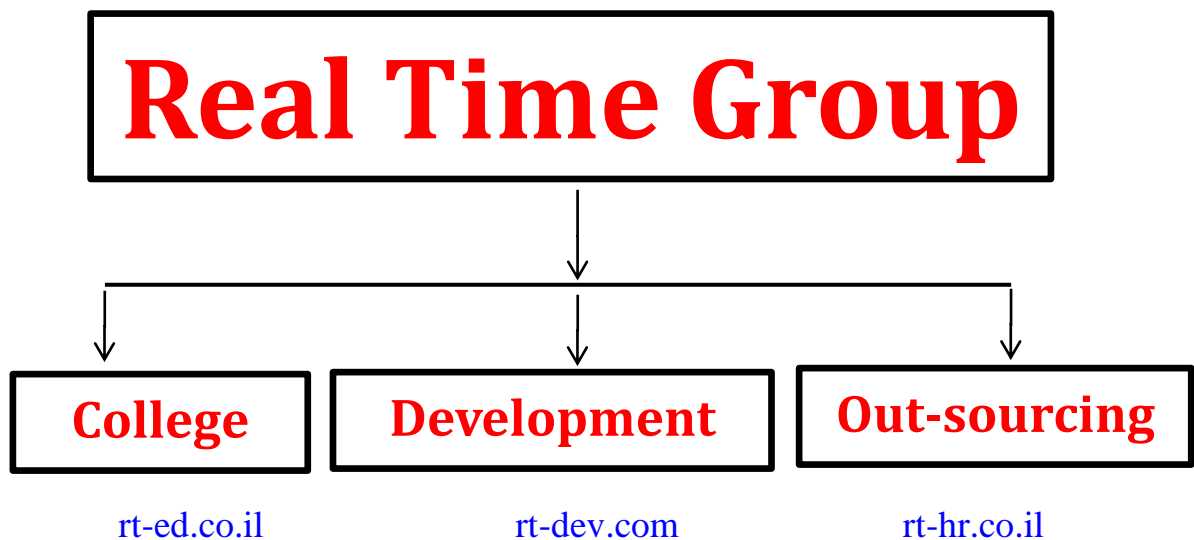
**Course: Practical Networking**

**Duration:** 60 Hours  
Hands-On-Training: 75%

Real Time Group is a multi-disciplinary dynamic and innovative Real-Time O.S. and Embedded Software Solutions Center, established in 2007.

Providing Bare-Metal and Embedded Linux solutions, professional services and consulting, end-to-end flexible system infrastructure, outsourcing, integration and training services for Hardware, Software and RT-OS \ Embedded Systems.

The company is divided into the following three Divisions:



### Training Division:

Professional Training Services for Hardware, Software, RT-OS and Embedded systems industries.

We provide the knowledge and experience needed to enable professional engineers to Develop, Integrate and QA Hardware, Software and Networking Projects.

In order to insure experience, all courses are practical – hands-on-training. The latest Development, QA and Automation equipment which are adopted by the industry are used.

All students are supplied with Development-Boards for home-work and course projects.

## **Course Overview:**

This Practical Networking course provides a comprehensive introduction to bits and bytes of the Packet switching network.

The first part starts with Traditional networking subjects, we'll go through the evolution of networks, networking concepts, Topologies and networking types, layered architecture, widely used networking devices (such as routers and switches). How Ethernet, TCP\IP Protocol stack works, Service Ports, TCP/UDP, ICMP and upper layer protocols (such as DNS, TFTP, SNMP work).

We'll learn how to use Traffic Generators, Sniffers and other networking tools.

The second part continues with "virtual computing", All new Networking concepts, definitions and algorithms such as **SDN** (Software Defined Networking), Open vSwitch (Virtual Switch), Open flow and much more.

## **Who should attend:**

- Managers, Engineers, Devops and QA personal who need to gain knowledge in networking for their projects.
- Linux \ Embedded system developers who need to implement a networking project on an Linux \ Embedded based system.
- Support engineers who need to improve their Networking experience.

## **Prerequisite:**

- A basic level of computer literacy is expected, using a PC running Windows.
- No previous experience in Networking is necessary

# Practical Networking

1. **OSI – relation model.**
  - a. What is a reference model?
  - b. The 7 OSI layers
  - c. Network hierarchical model.
  - d. Data Encapsulation.
  
2. **The Physical Layer**
  - a. Network Interface Card.
  - b. Physical Channels: Coax, UTP/STP.
  - c. wireless communication, Optical fibers.
  - d. cables, Physical devices, hubs repeaters, connectors.
  
3. **The Media Access Control Layer**
  - a. Data-link layer.
  - b. Local area network
  - c. Typical network topologies: FDDI, Mesh, Star, Ring.
  - d. Ethernet:
    1. MA\CD MAC protocol
    2. Frame processing.
    3. 10-Mbps Classic Ethernet
    4. 100 Mbps (Fast) Ethernet
    5. Gigabit \ XGigabit Ethernet
    6. Ethernet Switches
  
4. **The IPv4 Protocol**
  - a. The TCP/UDP/IP protocol stack.
  - b. The IPv4 Header
  - c. Special Addresses
  - d. Fragmentation
  - e. IP Routing
  - f. IPv4 classes and Subnets
  - g. Classless Internet Domain Routing (CIDR )
  - h. Mobile IP
  
5. **Networking Tools**
  - a. Sniffing and analyzing Data packets.
  - b. Packet Generators
  - c. Command line tools (arp, netsat, tcpdump ....)

## 6. The Address Resolution Protocol: ARP

- a. What is ARP used for
- b. ARP Header
- c. Reversed ARP (RARP)

## 7. User Datagram Protocol (UDP)

- a. The UDP Header
- b. UDP Based Applications:
- c. Trivial File Transport Protocol, TFTP
- d. Remote Procedure Call (RPC)

## 8. TCP Transport Protocol

- a. TCP Header
- b. TCP Connection Establishment Protocol - Three-Way Handshake
- c. TCP Sliding Windows
- d. TCP ACKs
- e. Nagle Algorithm
- f. TCP Flow Control
- g. Window Syndrome
- h. TCP Timeout and Retransmission
- i. KeepAlive
- j. TCP timers

## 9. TCP based Applications

- a. DNS
- b. Dynamic Host Configuration Protocol (DHCP)
- c. SNMP

## 10. Internet Control Message Protocol

- a. The IPv6 Header
- b. IPv6 Addresses

## 11. Virtual LAN (VLAN)

- a. Collision and Broadcast Domains.
- b. Vlan implementation –
- c. Port based VLAN

## 12. Networking Devices

- a. Ethernet Switches
- b. VLAN Based Switches
- c. Routers

## 13. IPv6

- a. The IPv6 Header
- b. IPv6 Addresses
- c. Network Prefixes
- d. IPv6 Multicast
- e. IPv6 Extension Headers
- f. Neighbor Discovery

## 14. Updating Routing-table Algorithms

- a. Network Address Translation
- b. Distance-Vector Routing-Update Algorithm
- c. Link-State Routing-Update Algorithm
- d. Border Gateway Protocol (BGP) 323
- e. Open Short Path First (OSPF)
- f. ASAS path

## 15. Software-Defined Networking

- g. Logical Centralized control
- h. Open Flow Protocol
- i. Data and Control planes
- j. Open vSwitch

## 16. Quality of Service & Traffic Management

- a. What is QOS used for
- b. Real-time Traffic
- c. Integrated Services / RSVP
- d. Global IP Multicast
- e. Differentiated Services
- f. WRED\RED
- g. Real-time Transport Protocol (RTP)
- h. Multi-Protocol Label Switching (MPLS)