

Explosive growth in network device diversity and mobile communications, along with global adoption of networking technologies, have overwhelmed IPv4 and have driven the development of a next-generation Internet Protocol (IPv6).

In addition to providing more address space, IPv6 not only increases routing efficiency and network-layer security (built-in the IPSec encryption mechanism) but also creates new ways of addressing and more advanced QoS mechanisms, as the protocol develops.

The design purpose of ITS-200 series is to provide learners with a clear and comprehensive understanding of the protocol and operating behavior of the IPv6 specification. The complete system includes ITS-201(host:client) , ITS-202(host:server) and ITS-203(router). The interaction of these three devices can perform experiment as a group or stand alone.

Package A

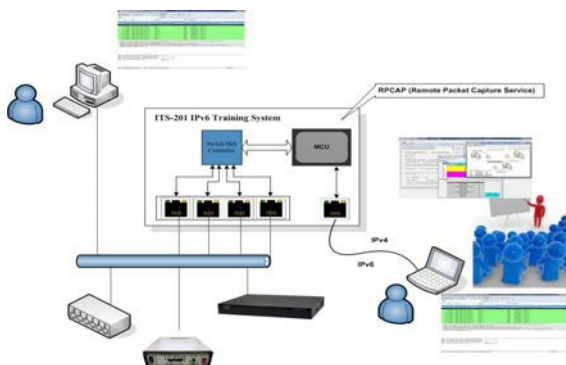


ITS-201

In order to conveniently observe various operating behavior of network packet flow under the different protocols, ITS-201 offers a console ethernet port and a 4-port switch hub to set up different network topologies. ITS-201 follows IPv4 and IPv6 Dual Stack protocol. In addition, we design a methodology to capture the network packet flow through console and switch hub port. The RPCAP (Remote Packet Capture) service enables remote network packet browse.

A customized graphical interface is designed to send IPv4 and IPv6 network packets. The "Wireshark Network Analyzer" software is used to capture and observe network packets. All experiments designed are following IPv6 RFC standard.

In order to completely present the function of IPv6 network server and router, Cisco 1905/K9 is specifically selected to serve as DHCPv6 server, router and firewall ...etc . By following IPv4 and IPv6 dual stack protocol. The embedded IOS system offers a user-friendly platform to operate IPv6 mechanism.



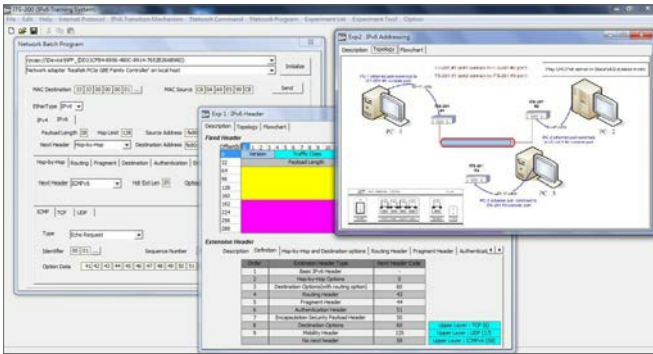
Features

- IPv4 and IPv6 Dual-Stack system
- Support Remote Packet Capture Service (RPCAP)
- Using filterable TAP to complete load-balancing and port-bonding to avoid browsed packet loss.
- Provide GUI software to send and browse IPv4 and IPv6 packet.
- Ipv4 : ICMP, TCP, UDP
- Ipv6 : Support ICMPv6, DHCPv6, Upper layer packet format and "Next Header" with Hop-by-Hop, Routing, Fragment, Destination...etc.
- Console and Port1~Port4 connect ports all support Auto-Negotiation.
- Experiments cover OSI Model 2 ~ 7 layer

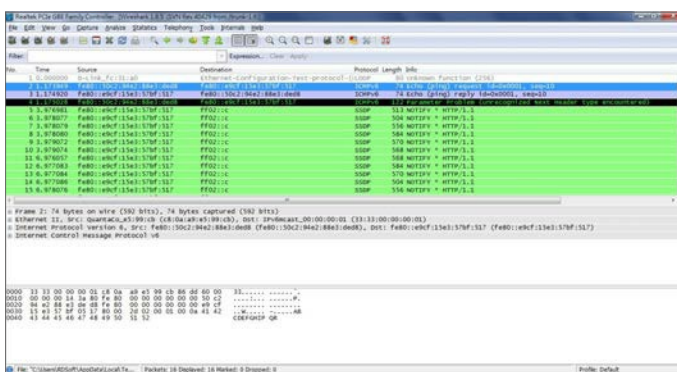
Specification

ITS-201

- AC power supply: 100V~240V AC, 47~63Hz
- CPU: ARM11, 32-bit RISC @667MHz
- Network device : (Auto-Negotiation)
 - Console : 10/100 Mb Ethernet (802.3) 1 Port
 - Port 1~4 : 4-port Switch Hub
- Embedded multi-tasking operating system
- IPv4/IPv6 dual stack
- Configuration parameters setting through web browser
- Customized graphical user interface(GUI)
 - Offer several types of IPv4 and IPv6 header to allow user to freely modify and send packet
 - Offer Windows 7 OS IPv6 command list
 - Offer IPv6 experiment list and relevant information



- Enable Remote Packet CAPture service (RPCAP) and use Wireshark software to observe network packets.



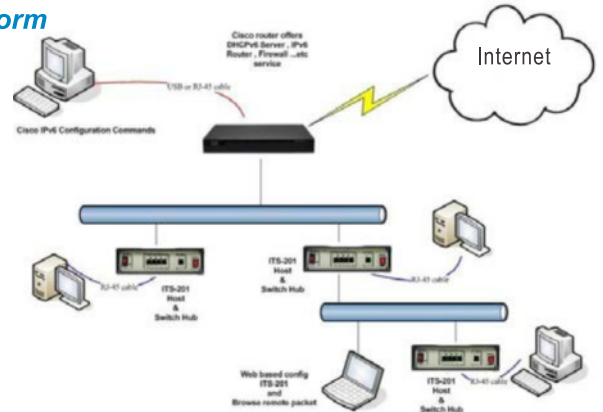
Cisco Router: (Standard : Cisco 1905/K9, Option : Cisco 1905-SEC/K9)

- AC power supply : 100V~240V AC, 47~63Hz
- Embedded IP Security / Secure Sockets Layer (IPSec / SSL)
- VPN hardware acceleration
- Integrated Gigabit Ethernet ports : 10/100/1000 Mb Ethernet
- WAN-routed ports
- Integrated serial port (HWIC-1T): for serial WAN connectivity
- Innovative universal-serial-bus (USB) based console access: mini-Type B USB console port supports management connectivity
- IPv4/IPv6 Dual Stack
- IPv6 Transition –Tunnel Mode (Cisco 1905-SEC/K9)
- IPv6 Transition –Translator Mode
- Protocols : IPv4, IPv6, static routes, Open Shortest Path First (OSPF), Border Gateway Protocol (BGP)...etc.
- Encapsulations : Ethernet, 802.1q VLAN, Point-to-Point Protocol
- (PPP), Point-to-Point Protocol over Ethernet (PPPoE), and ATM. Flow Control QoS, Class-Based Weighted Fair Queuing (CBWFQ), Policy-Based Routing (PBR), Performance Routing (PFR), and Network-Based Advanced Routing (NBAR)



Cisco 1905

Platform



List of Experiments

- Exp. 1 : ITS-201 brief introduction**
Unit 1 : ITS-201 hardware
Unit 2 : ITS-201 software
- Exp. 2 : Cisco 1905 router brief introduction**
Unit 1 : Configuration
Unit 2 : IPv6 Command list
- Exp. 3 : IPv6 Header**
Unit 1 : send IPv4 packet and the mechanism of RPCAP
Unit 2 : send IPv6 packet and observe the IPv6 header
- Exp. 4 : IPv6 Extension Header**
Unit 1 : Next Header is Hop-by-Hop Options Header
Unit 2 : Next Header is Fragment Header
Unit 3 : Next Header is TCP Header (HTTP)
Unit 4 : Next Header is UDP Header (DNS)
- Exp. 5 : IPv6 Addressing**
Unit 1 : Stateful DHCPv6(Dibbler Server/Client)
Unit 2 : Stateless DHCPv6(Dibbler Server/Client)
Unit 3 : Windows command-ipconfig/release6
Unit 4 : Windows command-ipconfig/ renew6
- Exp. 6 : DHCPv6**
Unit 1 : Stateful DHCPv6(Cisco 1905)
Unit 2 : Stateless DHCPv6(Cisco 1905)
Unit 3 : Stateless Autoconfiguration(Cisco 1905)
- Exp. 7 : ICMPv6 – Error Messages**
Unit 1 : Destination Unreachable
Unit 2 : Packet Too Big
Unit 3 : Time Exceeded
Unit 4 : Parameter Problem
- Exp. 8 : ICMPv6 – Information Messages**
Unit 1 : Ping IPv4 address and ARP command
Unit 2 : Ping IPv6 link-local address and NetSH command
Unit 3 : Ping IPv6 global unicast address
- Exp. 9 : Neighbor Discovery**
Unit 1 : Link-Layer Address Resolution
Unit 2 : Duplicate Address Detection
Unit 3 : Router Discovery
- Exp. 10 : IPv6 Transition**
Unit 1 : Dual Stack
Unit 2 : Tunnel(6 to 4, require Cisco 1905-SEC/K9 at option)
Unit 3 : Translator (NAT-PT)
- Exp. 11 : IPv6 Gateway and Route**
Unit 1 : IPv4 Gateway
Unit 2 : IPv6 Gateway
Unit 3 : Static Route

Products Combination Package A :

1. ITS-201 3 pcs
2. Cisco 1905/K9 1 pce

System Requirements :

1. PC with Pentium IV or above CPU
2. Windows 7 Service Pack 1 or upper version

Accessories :

1. Experiment manual : 3 pcs
2. Setup CD : 3 pcs

Package B



ITS-202

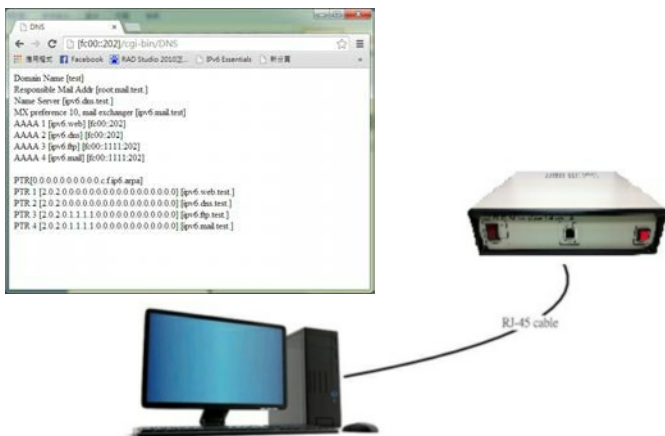
Features

- ITS-202 (host : server) , one of ITS-200 series , is designed by a series of internet service and web-based GUI interface.
- ITS-202 can be configured as 2 types of server :
A type offers IPv6 DHCP, IPv6 DNS and IPv6 web services.
B type offers IPv6 FTP , IPv6 SMTP , IPv6 POP and IPv6 web services.
- In order to provide cross-platform design, ITS-202 can also be configured through Microsoft Internet Explorer, Mozilla Firefox, Google Chrome and other browsers.

Specification

ITS-202

- AC power supply: 100V~240V AC, 47~63Hz
- CPU: ARM11, 32-bit RISC @667MHz
- Network interface : 10/100 Mb Ethernet(802.3) 1 port
- (Auto-Negotiation)
- Embedded multi-tasking operating system
- IPv4/IPv6 dual stack
- Configurable routing parameters through web browser



List of Experiments

- Exp. 1 : Observe IPv6 HTTP Packet**
- Exp. 2 : Observe IPv6 DHCP Packet**
Unit 1 : Stateful DHCPv6
Unit 2 : Stateless DHCPv6
- Exp. 3 : Observe IPv6 DNS Packet**
Unit 1 : AAAA record
Unit 2 : PTR record
- Exp. 4 : Observe IPv6 FTP Packet**
Unit 1 : Upload
Unit 2 : Download
- Exp. 5 : Observe IPv6 Mail Packet**
Unit 1 : SMTP
Unit 2 : POP3

Products Combination Package B :

- ITS-202 1 pce

System Requirements :

- PC with Pentium IV or above CPU
- Windows 7 Service Pack 1 or upper version

Accessories :

- Experiment manual : 1 pce
- RJ-45 cable 1M : 1 pce

Package C



ITS-203

Features

- ITS-203 (router), one of ITS-200 series, is designed by a series of network topology and user friendly GUI software. It supports static and dynamic routing protocols.
- ITS-203's dynamic routing protocol supports RIPng (Routing Information Protocol next generation) and OSPFv3 (Open Shortest Path First for IPv6), both are Interior Gateway Protocol (IGP) .

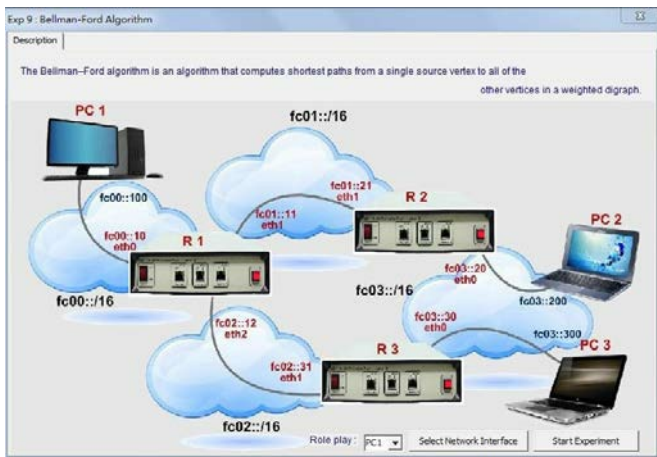
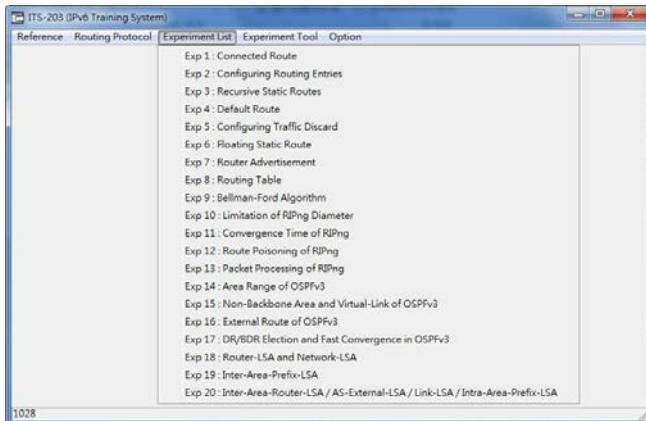


You can dynamically change the configuration and observe routing table information from ITS-203 GUI software or terminal interface.

Specification

ITS-203

- AC power supply: 100V~240V AC, 47~63Hz
- CPU: ARM11, 32-bit RISC @667MHz
- Network interface : 10/100 Mb Ethernet(802.3) 3 ports
- (Auto-Negotiation)
- Embedded multi-tasking operating system
- IPv4/IPv6 dual stack
- Configurable routing parameters through GUI or web browser
- Customized graphical user interface(GUI): Offer IPv6 routing experiment instruction



List of Experiments

- Exp. 1 : Connected route
- Exp. 2 : Configuring Routing Entries
- Exp. 3 : Recursive Static Routes
- Exp. 4 : Default Route
- Exp. 5 : Configuring Traffic Discard
- Exp. 6 : Floating Static Route
- Exp. 7 : Router Advertisement
- Exp. 8 : Routing Table
- Exp. 9 : Bellman-Ford Algorithm
- Exp. 10 : Limitations of RIPng
- Exp. 11 : Convergence Time of RIPng
- Exp. 12 : Route Poisoning of RIPng
- Exp. 13 : Packet Processing of RIPng
- Exp. 14 : Area Range of OSPF3
- Exp. 15 : Non-Backbone Area and Virtual-Link of OSPFv3
- Exp. 16 : External Route of OSPFv3
- Exp. 17 : DR/BDR Election and Fast Convergence in OSPFv3

Exp. 18 : Router-LSA and Network-LSA

Exp. 19 : Inter-Area-Prefix-LSA

Exp. 20 : Inter-Area-Router-LSA / AS-External-LSA / Link-LSA / Intra-Area-Prefix-LSA

Products Combination Package C :

- ITS-203: 3 pcs
- ITS-201: 1 pc (Option)

System Requirements:

- PC with Pentium IV or above CPU
- Windows 7 Service Pack 1 or upper version

Accessories:

- Experiment manual : 3 pcs
- Setup CD: 3 pcs
- RJ-45 cable 1M: 9 pcs

Package D

Products Combination Package D:

- ITS-201: 3 pcs
- ITS-202: 2 pcs
- ITS-203: 3 pcs
- Cisco 1905/K9: 1 pc

Specification

ITS-201

- AC power supply: 100V~240V AC, 47~63Hz
- Network device : (Auto-Negotiation)
 - Console : 10/100 Mb Ethernet (802.3) 1 Port
 - Port 1~4 : 4-port Switch Hub
- Embedded multi-tasking operating system
- IPv4/IPv6 protocol stack
- Enable Remote Packet CAPture service (RPCAP) and use Wireshark software to observe network packets.
- Configurable routing parameters through GUI or web Browser

ITS-202

- AC power supply: 100V~240V AC, 47~63Hz
- Network interface : 10/100 Mb Ethernet(802.3) 1 port (Auto-Negotiation)
- Embedded multi-tasking operating system
- IPv4/IPv6 dual stack
- Configurable routing parameters through web browser

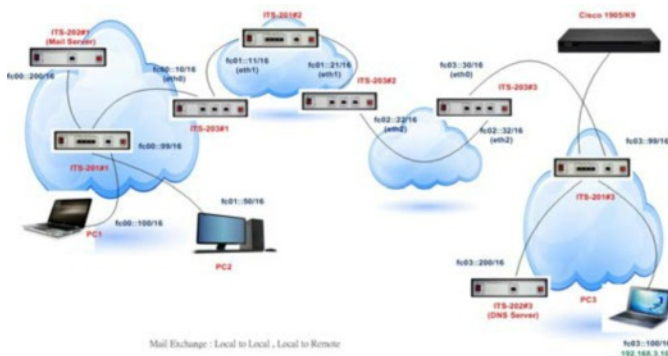
ITS-203

- AC power supply: 100V~240V AC, 47~63Hz
- Network interface : 10/100 Mb Ethernet(802.3) 3 ports (Auto-Negotiation)
- Embedded multi-tasking operating system
- IPv4/IPv6 dual stack
- Configurable routing parameters through GUI or web browser

Cisco-1905/K9

- AC power supply: 100V~240V AC, 47~63Hz
- Embedded IP Security / Secure Sockets Layer (IPSec / SSL) VPN hardware acceleration
- Integrated Gigabit Ethernet ports : 10/100/1000
- Gigabit Ethernet WAN-routed ports
- IPv4/IPv6 Dual Stack
- IPv6 Transition –Tunnel Mode
- IPv6 Transition –Translator Mode
- Protocols: IPv4, IPv6, static routes, Open Shortest Path First (OSPF), Border Gateway Protocol (BGP)...etc.

Topology



List of experiment

ITS-201 * 3 + Cisco 1905/K9 :

- Exp.1 : Introduction to ITS-201
- Exp.2 : Overview for Cisco 1905 router
- Exp.3 : IPv6 Header
- Exp.4 : IPv6 Extension Header
- Exp.5 : IPv6 Addressing
- Exp.6 : DHCPv6
- Exp.7 : ICMPv6 - Error Messages
- Exp.8 : ICMPv6 - Information Messages
- Exp.9 : Neighbor Discovery
- Exp.10 : IPv6 Transition
- Exp.11 : IPv6 Gateway and Route

ITS-202 * 1 :

- Exp.1 : Observe IPv6 HTTP Packet
- Exp.2 : Observe IPv6 DHCP Packet
- Exp.3 : Observe IPv6 DNS Packet

ITS-203 * 3 :

- Exp.1 : Connected route
- Exp.2 : Configuring Routing Entries
- Exp.3 : Recursive Static Routes
- Exp.4 : Default Route
- Exp.5 : Configuring Traffic Discard
- Exp.6 : Floating Static Route
- Exp.7 : Router Advertisement
- Exp.8 : Routing Table
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- Exp.18 : Router-LSA and Network-LSA
- Exp.19 : Inter-Area-Prefix-LSA
- Exp.20 : Inter-Area-Router-LSA / AS-External-LSA / Link-LSA / Intra-Area-Prefix-LSA

ITS-201 x 3 + ITS-202 x 2 + ITS-203 x 3 + Cisco 1905/K9:

- Exp.1 : Network Topology
- Exp.2 : Domain and IP Address
- Exp.3 : Static Routing Rule
- Exp.4 : Observe Remote Capture HTTP Packets
- Exp.5 : Observe IPv6 DNS Service
- Exp.6 : Observe : Stateful DHCPv6 , Stateless DHCPv6 , SLAAC
- Exp.7 : Observe FTP Upload and Download packets

System Requirements :

1. PC with Pentium IV or above CPU
2. Windows 7 Service Pack 1 or upper version

Accessories :

1. ITS-201 Experiment Manual: 3 pcs
2. ITS-202 Experiment Manual: 2 pcs
3. ITS-203 Experiment Manual: 3 pcs
4. Integrated Experiment Manual: 3 pcs
5. ITS-201 Setup CD : 3 pcs
6. ITS-203 Setup CD : 3 pcs
7. RJ-45 cable: 26 pcs

K&H MFG. CO., LTD.

5F, No. 8, Sec. 4 Tzu-Chiang Rd., San Chung City 241,
Taipei Hsien, Taiwan R.O.C.

<http://www.kandh.com.tw> E-Mail: education@kandh.com.tw

Fax: 886-2-2287-3066, 2287-9704 Tel: 886-2-2286-0700, 2286-7786

RAPAS kft

1184 Budapest Üllői út 315.

Tel: 06 1 294 2900 Email: rapaskft@digikabel.hu Internet:
www.oktatasi-eszkoz.hu