

## Bridging and Switching

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- Frame relay
  - L2/L3 Resolution
  - Broadcast / Multicast Support
  - LMI Types
  - Full Mesh / Partial Mesh
  - Hub & Spoke via Point-to-Point
  - Hub & Spoke via Multipoint
  - PPP over FR
  - End-2-End Keepalives (EEK)
  - Broadcast Queue
  - Load Interval
  - Ping Local Interface
  - Bridging
  - Payload Compression
    - FRF.9 (frame-relay map... payload-compress...) (frame-relay payload -compress...)
  - FR Payload Fragmentation (frame-relay fragment xxx end-to-end) + MQC
- Catalyst configuration:
  - VLANs
    - Traffic Filtering (VACL)
      - IP: 0x800
      - IPv6: 0x86DD
      - ARP: 0x806 (permit any any 0x806)
      - STP over ISL: 0x42 → permit any any **Isap** 0x4242 0x0
      - STP over 802.1q: 0xAA → permit any any **Isap** 0xAAAA 0x0
      - VTP: mac ACL type 0x2003 0x0 (ndey any host 0100.0cccc.cccc 0x2003 0x0)
      - DTP: 0x2004
      - CDP: 0x2000
    - QinQ
    - Extended-Range VLAN
    - Voice Vlan
    - Inter Vlan Routing
  - VTP
    - Modes
    - Version 2
    - Pruning
  - STP
    - Cost
    - Port Priority
    - Timers
    - Portfast
    - Uplinkfast (Direkte Link Failures)
      - Max-Rate für Updates
    - Backbonefast (Indir. Link Failures)
    - BPDU Guard
    - BPDU Filter
    - Loop Guard
    - Root Guard
    - EtherChannel Guard
    - Load Sharing using STP Port Priorities / Costs
    - Root / Secondary Root
      - Diameter Command (span vlan x root primary *diameter* 2-7)  
"Set the maximum number of switches between any two end stations"
  - MSTP
  - RSTP
  - Trunk
    - ISL
    - Dot1Q
    - Block DTP (nonnegiate)
    - Block VTP (Transparent Mode)
    - Router on a Stick
    - Pruning
    - Native Vlan
  - Etherchannel (<http://www.cisco.com/en/US/docs/ios/cether/configuration/guide/ce-lnkbnl.html>)
    - L2 Channel
    - L3 Channel
    - PagP
      - Learn Method
      - Priority
    - LACP
      - System Priority
      - Port Priority
    - Mode on
    - Load Balancing
  - Management
    - MAC Address Aging Time
    - MAC Address notification Traps
    - Unicast MAC Address Filtering
    - System Resources / Templates → SDM

- Smartport Macros
    - Macros
    - System MTU
    - Flow Control (Interface Characteristics -> 802.3X Flow Control)
  - Features
    - Fallback Bridging
      - Aging Time
      - Filtering by Specific MAC Address
      - Adjusting STP Parameters
    - (R)SPAN
    - UDLD
    - Link-State Tracking (link state track ...)
    - FlexLinks (switchport backup interface ...)
    - 802.1X (→ see security for more details)
  - Layer 3
- Tunneling
- PPP/HDLC
  - Authentication
    - PAP
    - CHAP
    - Direction
  - Peer Neighbor Route
  - LQM / Link Quality Monitoring / RFC1333 (ppp quality ...)
  - PPP Half-Bridging (ppp bridge ip) vs Bridge Groups
  - PPP over FR
  - Serial Clocking
  - PPP Multilink
    - MRRU ([http://www.cisco.com/en/US/docs/ios/12\\_3t/12\\_3t7/feature/guide/gtmpmrru.html](http://www.cisco.com/en/US/docs/ios/12_3t/12_3t7/feature/guide/gtmpmrru.html))
    - Multilink Fragmentation and Interleaving
    - Second Link Up
      - Dialer load-threshold 1
      - ppp multilink links minimum 2 mandatory ([http://www.cisco.com/en/US/products/sw/iosswrel/ps1839/products\\_feature\\_guide09186a00801bd4f4.html](http://www.cisco.com/en/US/products/sw/iosswrel/ps1839/products_feature_guide09186a00801bd4f4.html))
- Bridging
  - IRB
  - Transparent Bridging

## IP IGP Routing

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- OSPF
  - Timer Manipulations / Network Type
    - Hello-Timer Manipulation
    - Set Network Type (ip ospf network ...)
  - NBMA / Frame-Relay
  - Demand Circuit (ip ospf demand-circuit)
  - OSPF Flood Reduction (ip ospf flood-reduction)
  - Passive Interface
  - Inter-Connecting Area0
    - Virtual-Link Concept / Backbone Area
    - GRE Tunnel
    - Redistribution between different OSPF Process on same Router
  - Authentication
    - Virtual Link
    - Area Authentication on Interface
    - Within OSPF Process
    - MD5 / Cleartext
  - Summarization
    - Area Range
    - Summary Address
  - Area Transit Capability ([http://www.cisco.com/en/US/docs/ios/12\\_0s/feature/guide/ospfatc.html](http://www.cisco.com/en/US/docs/ios/12_0s/feature/guide/ospfatc.html))
  - Filtering
    - Inbound Filtering ([http://www.cisco.com/en/US/docs/ios/12\\_0s/feature/guide/fsoredis.html](http://www.cisco.com/en/US/docs/ios/12_0s/feature/guide/fsoredis.html)) [redistribute maximum-prefix ...]
    - Area Filtering / OSPF ABR Type 3 LSA Filtering ([http://www.cisco.com/en/US/docs/ios/12\\_2t/12\\_2t4/feature/guide/ftabrt3f.html](http://www.cisco.com/en/US/docs/ios/12_2t/12_2t4/feature/guide/ftabrt3f.html)) [area ... filter]
  - Cost Manipulation
    - Auto-Cost Reference Bandwidth
    - IP OSPF Cost
    - Bandwidth Manipulation
  - SPF Throttling ([http://www.cisco.com/en/US/docs/ios/12\\_2s/feature/guide/fs\\_spttrl.html](http://www.cisco.com/en/US/docs/ios/12_2s/feature/guide/fs_spttrl.html))
  - Incremental SPF / iSPF ([http://www.cisco.com/en/US/docs/ios/12\\_0s/feature/guide/ospfisfpf.html](http://www.cisco.com/en/US/docs/ios/12_0s/feature/guide/ospfisfpf.html))
  - LSA Throttling ([http://www.cisco.com/en/US/docs/ios/12\\_0s/feature/guide/fsolsath.html](http://www.cisco.com/en/US/docs/ios/12_0s/feature/guide/fsolsath.html))
  - LSA Overload Protection ([http://www.cisco.com/en/US/docs/ios/12\\_0s/feature/guide/ospfopro.html](http://www.cisco.com/en/US/docs/ios/12_0s/feature/guide/ospfopro.html)) [max-lsa...]
  - Load-Balancing
    - maximum-paths
    - manipulate costs (bandwidth, ip ospf cost ...)
  - Stub Areas

- Stub Router Advertisement ([http://www.cisco.com/en/US/docs/ios/12\\_2t/12\\_2t4/feature/guide/ftospfau.html](http://www.cisco.com/en/US/docs/ios/12_2t/12_2t4/feature/guide/ftospfau.html)) [max-metric router-lsa...]
- Unicasting Hellos
  - Nonbroadcast Network Type + Neighbor
- Support for Fast Hello Packets ([http://www.cisco.com/en/US/docs/ios/iproute/configuration/guide/irp\\_ospf\\_fast\\_hello\\_ps6441\\_TSD\\_Products\\_Configuration\\_Guide\\_Chapter.html](http://www.cisco.com/en/US/docs/ios/iproute/configuration/guide/irp_ospf_fast_hello_ps6441_TSD_Products_Configuration_Guide_Chapter.html)) [ip ospf dead-interval minimal...]
- Loopback Advertising
  - Network Type p2p → /24
  - Area Range
  - Redistribute + Route-Map
- Retransmissions ([http://www.cisco.com/en/US/docs/ios/12\\_2t/12\\_2t11/feature/guide/ft11ospf.html](http://www.cisco.com/en/US/docs/ios/12_2t/12_2t11/feature/guide/ft11ospf.html)) [limit retransmissions ...]
- Forwarding Address Suppression in Translated Type-5 LSAs ([http://www.cisco.com/en/US/docs/ios/12\\_2t/12\\_2t15/feature/guide/ftoadsup.html](http://www.cisco.com/en/US/docs/ios/12_2t/12_2t15/feature/guide/ftoadsup.html))
- OSPF Nonstop Forwarding (NSF) Awareness ([http://www.cisco.com/en/US/docs/ios/12\\_2t/12\\_2t15/feature/guide/ftosnsfa.html](http://www.cisco.com/en/US/docs/ios/12_2t/12_2t15/feature/guide/ftosnsfa.html)) [ip ospf resync-timeout ...]
- Default Route Origination
  - Default-information originate (always)
- EIGRP**
  - Authentication
  - Summarization
    - Floating Summary Routes ([http://www.cisco.com/en/US/docs/ios/iproute/configuration/guide/irp\\_cfg\\_eigrp\\_ps6350\\_TSD\\_Products\\_Configuration\\_Guide\\_Chapter.html#wp1054611](http://www.cisco.com/en/US/docs/ios/iproute/configuration/guide/irp_cfg_eigrp_ps6350_TSD_Products_Configuration_Guide_Chapter.html#wp1054611))
  - Composite Metric Manipulation
    - Using offsets to Routing Metrics
  - Adjusting Timers
  - Split Horizon
  - Neighbor Command
  - Network Command with 0.0.0.0 Netmask
  - Percentage of Link Bandwidth Used (bandwidth-percent)
  - EIGRP Stub
  - Filtering
    - Distribute List (+ route-maps)
    - Offset List
    - Administrative distance
    - Metric maximum hops
  - Passive Interface
  - EIGRP Prefix Limit
    - Maximum Prefix (only with VRF Address Families!) ([http://www.cisco.com/en/US/docs/ios/iproute/configuration/guide/irp\\_eigrp\\_pref\\_limit\\_ps6441\\_TSD\\_Products\\_Configuration\\_Guide\\_Chapter.html](http://www.cisco.com/en/US/docs/ios/iproute/configuration/guide/irp_eigrp_pref_limit_ps6441_TSD_Products_Configuration_Guide_Chapter.html)) ([http://www.cisco.com/en/US/docs/ios/12\\_0s/feature/guide/cs\\_epls.html](http://www.cisco.com/en/US/docs/ios/12_0s/feature/guide/cs_epls.html)) [neighbour ... maximum-prefix ...]
  - EIGRP SNMP Support
  - EIGRP Nonstop Forwarding (NSF) Awareness ([http://www.cisco.com/en/US/docs/ios/12\\_2t/12\\_2t15/feature/guide/ft\\_ensf.html](http://www.cisco.com/en/US/docs/ios/12_2t/12_2t15/feature/guide/ft_ensf.html)) [timers nsf ...]
  - Default Route Origination
    - Redistribute static + 0.0.0.0/0
    - ip default-network
    - summary-route für 0.0.0.0/0
- RIPv2**
  - Authentication (Text/ MD5)
  - (no) Auto-Summary / Summarization
  - Filtering
    - Offset Lists
    - Distribute Lists
      - Gateway option
    - (Administrative) Distance
    - RIP Version Mismatching
  - Adjusting Timers [timers basic update ...]
    - Inter packet delay [output-delay ...]
  - Split Horizon
  - Disabling Validation of Source IP Addresses [no validate-update-source]
  - Passive Interface
  - Unicast Updates
    - Neighbor + Passive Interface
    - NAT multicast Address to unicast
    - Broadcast: ip ip v2-broadcast + ip broadcast address x.x.x.x
  - Default Route Origination
    - Redistribute static + 0.0.0.0/0
    - Default-information originate
    - ip default-network
  - Triggered Updates on WAN [ip rip triggered]
- ODR**
  - Filtering ODR Information
  - CDP and/or ODR Timers
  - Redistributing ORD

## IPv6

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- IPv6 Addressing
  - MAC to IPv6 Address
- IPv6 Autoconfiguration
- Configuring Frame-Relay
- IPv6 ICMP Types
- IPv6 Tunneling
  - 6to4 (tunnel mode ipv6ip 6to4) → 2002::/16
  - GRE Tunneling (default tunnel mode)
  - IPv6 in IPv4 (tunnel mode ipv6ip)
  - ISATAP Tunnel (tunnel mode ipv6ip isatap)
- RIPv6
  - Enabling RIPv6 on
    - NBMA (FR)
    - Broadcast
  - Split Horizon
  - Redistribute IPv6 Routes to RIP
  - Configuring Tags
  - Summarization (ipv6 rip xxx summary-address ...)
  - Filtering
    - Distribute List
    - Prefix-List
    - Metric Offset
- OSPFv3
  - Enabling OSPF on Interface
  - Defining an OSPF IPv6 area range
  - Authentication on an Interface
  - Authentication in an OSPF area
- EIGRP (similar to IPv4)
  - "no shutdown" within the process
- DHCP
- NAT IPv6 <-> IPv4

## Rechability

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- NAT
- Aggregate
- Static Routes
  - Floating Static Routes
  - Routes + Tracker Objects
- Redistribution
  - Route Tagging
  - Administrative Distance
  - Distribute-List
  - Adjusting Metric / Metric Type
    - Default Metric
- Policy-Routing
  - PBR Next-Hop (set ip default next-hop / set ip next-hop)
  - Verify-Availibility (CDP)
  - PBR Support for Multiple Tracking Options  
([http://www.cisco.com/en/US/docs/ios/12\\_3t/12\\_3t4/feature/guide/gtpbrtrk.html](http://www.cisco.com/en/US/docs/ios/12_3t/12_3t4/feature/guide/gtpbrtrk.html))
  - PBR Recursive Next Hop  
([http://www.cisco.com/en/US/docs/ios/iproute/configuration/guide/irp\\_prb\\_rec\\_next\\_hop.html](http://www.cisco.com/en/US/docs/ios/iproute/configuration/guide/irp_prb_rec_next_hop.html))
- Default Route Generation (see IGP)
- Default Route
- Route-Map
- Tunnel / GRE
- Administrative Distance Manipulation

## BGP

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- IBGP
  - Synchronization
  - Conferderation
  - Route-Reflector
  - Non-BGP Speaker in Transit
    - Tunnel
    - Redistribute in IGP
    - Static Route
    - Default-Route
    - Policy Route
- EBGP
  - Multihop
- Filtering
  - Route-Map
  - AS Path Filtering
  - Advertise-Map
  - Inject-Map
  - Well Known Communities
    - No-advertise

- No-export
  - Local-as
- Advertising
  - Conditional Route Advertisement ([http://www.cisco.com/en/US/tech/tk365/technologies\\_configuration\\_example09186a0080094309.shtml](http://www.cisco.com/en/US/tech/tk365/technologies_configuration_example09186a0080094309.shtml))
  - Network Statement
  - Redistribution
  - Aggregate address Statement
  - Default-Route
- (Best) Path Manipulation ([http://www.cisco.com/en/US/tech/tk365/technologies\\_tech\\_note09186a0080094431.shtml](http://www.cisco.com/en/US/tech/tk365/technologies_tech_note09186a0080094431.shtml))
  - Local Pref
  - Weight
  - AS-Path
  - MED
  - Next-Hop IGP Metric Manipulation
- Backdoor Routes
- Next-hop-self
- Remove-Private AS
- Summarization
  - Suppress-Map
  - Unsuppress-Map
- Aggregation
- Authentication / Password
- BGP Router-ID
- Load Balancing (maximum-paths)
- ORF Capabilities
- Regexp
  - Regexp Engine Performance Enhancement ([http://www.cisco.com/en/US/docs/ios/12\\_0s/feature/guide/s\\_rexpe.html](http://www.cisco.com/en/US/docs/ios/12_0s/feature/guide/s_rexpe.html)) [bgp regexp deterministic]
- Hide Local-AS / BGP Hide Local-Autonomous System ([http://www.cisco.com/en/US/docs/ios/12\\_2t/12\\_2t11/feature/guide/ft11bhla.html](http://www.cisco.com/en/US/docs/ios/12_2t/12_2t11/feature/guide/ft11bhla.html)) [neighbour ... local-as ...]
- BGP Path Cost Community ([http://www.cisco.com/en/US/docs/ios/12\\_0s/feature/guide/s\\_bgpcc.html](http://www.cisco.com/en/US/docs/ios/12_0s/feature/guide/s_bgpcc.html)) [set extcommunity cost igp ...]
- Max-Prefix Limit (+warn-only)
- BGP Policy Accounting ([http://www.cisco.com/en/US/docs/ios/12\\_2t/12\\_2t13/feature/guide/ft\\_bgppa.html](http://www.cisco.com/en/US/docs/ios/12_2t/12_2t13/feature/guide/ft_bgppa.html))
- Support for TTL Security Check ([http://www.cisco.com/en/US/docs/ios/12\\_3t/12\\_3t7/feature/guide/gt\\_btsh.html](http://www.cisco.com/en/US/docs/ios/12_3t/12_3t7/feature/guide/gt_btsh.html)) [neighbour ... ttl-security hops ...]
- Support for Fast Peering Session Deactivation ([http://www.cisco.com/en/US/docs/ios/1x2\\_3t/12\\_3t14/feature/guide/gt\\_bsfa.html](http://www.cisco.com/en/US/docs/ios/1x2_3t/12_3t14/feature/guide/gt_bsfa.html)) [fall-over / fast-fail over]
- BGP Support for Next-Hop Address Tracking ([http://www.cisco.com/en/US/docs/ios/12a\\_4t/ip\\_route/configuration/guide/brbadv.html#wp1109430](http://www.cisco.com/en/US/docs/ios/12a_4t/ip_route/configuration/guide/brbadv.html#wp1109430))
- BGP Route Dampening

## IP and IOS Features

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- IP addressing
- ICMP Types
- Switching Path ([http://www.cisco.com/en/US/tech/tk827/tk831/technologies\\_white\\_paper09186a00800a62d9.shtml](http://www.cisco.com/en/US/tech/tk827/tk831/technologies_white_paper09186a00800a62d9.shtml))
  - Process Switching
  - CEF Switching
  - Fast Switching
  - Flow Cache Switching / Netflow Switching ([http://www.cisco.com/en/US/docs/ios/11\\_2/feature/guide/netflow.html](http://www.cisco.com/en/US/docs/ios/11_2/feature/guide/netflow.html)) [ip route-cache flow]
- TCP
  - Performance Parameters ([http://www.cisco.com/en/US/docs/ios/ipapp/configuration/guide/ipapp\\_tcp\\_ps6350\\_TSD\\_Products\\_Configuration\\_Guide\\_Chapter.html](http://www.cisco.com/en/US/docs/ios/ipapp/configuration/guide/ipapp_tcp_ps6350_TSD_Products_Configuration_Guide_Chapter.html))
  - Windowing / Window Scaling
  - Keepalive Packet Service ([http://www.cisco.com/en/US/docs/ios/netmgmt/configuration/guide/nm\\_troubleshooting\\_ps6441\\_TSD\\_Products\\_Configuration\\_Guide\\_Chapter.html#wp1054796](http://www.cisco.com/en/US/docs/ios/netmgmt/configuration/guide/nm_troubleshooting_ps6441_TSD_Products_Configuration_Guide_Chapter.html#wp1054796))
  - ECN / Explicit Congestion Notification ([http://www.cisco.com/en/US/docs/ios/12\\_3t/12\\_3t7/feature/guide/gttcpecn.html](http://www.cisco.com/en/US/docs/ios/12_3t/12_3t7/feature/guide/gttcpecn.html))
- DHCP
  - DHCP Config
    - Host Pools / Static Entries
  - IP Helper
  - Multiple Default Gateways
  - DHCP Snooping (on 3550)
  - DHCP Relay and Option 82
  - DHCP Option 150 vs Option 066 (=next-server) → Multiple TFTP Server / Can be also a string [option 66 string "abcd"]
  - Reforwarding Policy / DHCP Relay Agent ([http://www.cisco.com/en/US/docs/ios/ipaddr/configuration/guide/iad\\_dhcp\\_rly\\_agt.html](http://www.cisco.com/en/US/docs/ios/ipaddr/configuration/guide/iad_dhcp_rly_agt.html))
  - IP Source Guard
- Gateway Redundancy
  - HSRP
    - Interface Tracking
    - Multiple Groups
    - Authentication and Timers

- VRRP
        - Object Tracking
        - MD5 Authentication
      - GLBP
        - Authentication
          - MD5
          - Text
        - Weighting Values
        - Object Tracking
  - IP services
    - IP Event Dampening
    - WCCP
      - Excluding Traffic from Redirection
      - Using ACL for Serve Group
      - Setting Password for a Router and Cache Engine
      - Outbound ACL Check  
([http://www.cisco.com/en/US/docs/ios/12\\_3t/12\\_3t7/feature/guide/gtwccpoa.html](http://www.cisco.com/en/US/docs/ios/12_3t/12_3t7/feature/guide/gtwccpoa.html))
      - Increased Services  
([http://www.cisco.com/en/US/docs/ios/12\\_2sx/12\\_2sxh/feature/guide/sx\\_wccp.html](http://www.cisco.com/en/US/docs/ios/12_2sx/12_2sxh/feature/guide/sx_wccp.html))
    - IP Accounting
      - Precedence
      - ACL Violations
      - Logging / Keeping History
    - DRP Server Agent
    - DNS Server
    - TFTP Server
    - FTP Server/Client
    - RARP Server
    - Auto Install
  - IOS user interfaces
  - System management
    - Auto command / Menu
    - IOS Banners
    - Archive ([http://www.cisco.com/en/US/docs/ios/12\\_3t/12\\_3t4/feature/guide/gtconlog.html](http://www.cisco.com/en/US/docs/ios/12_3t/12_3t4/feature/guide/gtconlog.html))
      - Hide Password
      - Logging to Syslog
      - History Table
    - Compressing Configuration
    - Disabling Parser Cache ([http://www.cisco.com/en/US/docs/ios/12\\_1t/12\\_1t5/feature/guide/dt5parse.html](http://www.cisco.com/en/US/docs/ios/12_1t/12_1t5/feature/guide/dt5parse.html)) [no parser cache]
    - Warm Reboot
    - Reallocation processor and I/O memory
    - Embedded Resource Manager  
([http://www.cisco.com/en/US/docs/ios/12\\_3t/12\\_3t14/feature/guide/gt\\_rmimg.html](http://www.cisco.com/en/US/docs/ios/12_3t/12_3t14/feature/guide/gt_rmimg.html))
    - Logging
      - Timestamps
      - Sequences
      - History
      - XML Formatted System Logging Messages  
([http://www.cisco.com/en/US/docs/ios/12\\_2t/12\\_2t15/feature/guide/ftxmlsys.html](http://www.cisco.com/en/US/docs/ios/12_2t/12_2t15/feature/guide/ftxmlsys.html))
      - Count
      - Logging to Syslog
        - Difference between: logging host 1.1.1.1 and logging 1.1.1.1 ...
        - UDP
        - TCP
    - TTY
      - Rotary / Using other Ports  
([http://www.cisco.com/en/US/docs/ios/12\\_1t/12\\_1t1/feature/guide/dtasyncq.html](http://www.cisco.com/en/US/docs/ios/12_1t/12_1t1/feature/guide/dtasyncq.html))
    - HTTP
      - http Authentication
      - Filtering Access to http Server
      - Changing http Server Prot Number
      - Uploading/Downloading Files via http/HTTPS
    - Crash / Exception Management
    - KRON Jobs
  - NAT
    - NAT Order of Operation
    - NAT Inside
    - NAT Outside
      - Configuring overlapping networks
    - NAT Timeouts
    - NAT Virtual Interface
    - Overload Interface Outbound to Hide Internal Details
    - TCP Load Balacing
    - Using Route-Maps for Decision-Making
    - Limiting # of concurrent NAT operations
    - High-availbility NAT / Stateful NAT mit HSRP
  - NHRP
    - Configuring NHRP Authentication

- Using GRE for Multipoint Operation
- NTP
  - Master
  - NTP Server
  - Client
  - Bidirectional
  - Authentication
    - Access Groups (peer to be allowed for 127.127.7.1)
  - Multicast Updates
  - Broadcast Mode
  - Synching Hardware Clock [ntp update-calendar]
- SNMP
  - Persistent ifIndex
  - Event Tracing
  - CPU and Memory Threshold Notification
  - Traps
  - Informs
  - Communities
    - 1, 2c, 3
    - Users
  - ACL / Protection
  - Views
  - MAC Address Notifications (see L2 section)
- RMON
- Accounting
- IP SLA / Enhanced Object Tracking
  - Tracking Line Protocol State
  - Tracking IP-Routing State
  - Combining Tracking (Boolean AND/OR) → Tracking Lists
  - Tracking Threshold of Routing Metrics
  - Tracking IP Reachability (Ping)
- IRDP
- Telnet
  - Establishing Terminal Session Limits
  - Displaying Line Connection Information
  - Chunk-size [ip tcp chunk-size ...]
  - Assign IP address to service provided on a TCP port
  - Busy-message
  - Vacant-message
  - Telnet message on successful connection
  - Refuse-message
  - Suppressing onscreen messages during Telnet connections [ip telnet quiet]
  - Saving Local Settings Between Sessions [private]
  - Defining Escape character and other key sequences
  - Setting terminal screen length and width
  - Enable session locking
  - Configuring Banners using tokens
  - Login Enhancements (block-for, quiet-mode, delay, etc.)
    - [http://www.cisco.com/en/US/docs/ios/security/configuration/guide/sec\\_login\\_enhance\\_ps6350\\_TSD\\_Products\\_Configuration\\_Guide\\_Chapter.html](http://www.cisco.com/en/US/docs/ios/security/configuration/guide/sec_login_enhance_ps6350_TSD_Products_Configuration_Guide_Chapter.html)
  - Hiding Telnet Addresses

## IP Multicast

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- MAC to Multicast Address
- PIM-SM, bi-directional PIM
  - Static RP Config
  - AutoRP
    - RP Announce Filter
  - BSR
  - Neighbor Filter
  - NBMA Mode
  - Static Mroutes
  - Tunnel in Hub & Spoke Configuration (Failed RPF Check)
- MSDP
- IGMP
  - IGMP Access Groups
  - IGMP Version
  - Join Group
  - Static Group
  - Immediate Leave
  - IGMP Snooping and MVR
  - Timers
- Multicast tools, source specific multicast
  - Multicast Helper
  - Multicast Rate Limiting
  - TTL Threshold
  - IP Multicast Boundary
  - SPT Threshold
  - Stub IP Multicast Routing

- sdr listener Support [ip sdr listen]
- Load Splitting IP Multicast Traffic over ECMP  
([http://www.cisco.com/en/US/docs/ios/12\\_4t/ip\\_mcast/configuration/guide/mctlsplt.html](http://www.cisco.com/en/US/docs/ios/12_4t/ip_mcast/configuration/guide/mctlsplt.html))
- Multicast Routing Monitor  
([http://www.cisco.com/en/US/docs/ios/jpmulti/configuration/guide/imc\\_routing\\_monitor\\_ps6350\\_TSD\\_Products\\_Configuration\\_Guide\\_Chapter.html](http://www.cisco.com/en/US/docs/ios/jpmulti/configuration/guide/imc_routing_monitor_ps6350_TSD_Products_Configuration_Guide_Chapter.html))
- Multicast Heartbeat  
([http://www.cisco.com/en/US/docs/ios/jpmulti/configuration/guide/imc\\_monitor\\_maint\\_ps6350\\_TSD\\_Products\\_Configuration\\_Guide\\_Chapter.html#wp1046512](http://www.cisco.com/en/US/docs/ios/jpmulti/configuration/guide/imc_monitor_maint_ps6350_TSD_Products_Configuration_Guide_Chapter.html#wp1046512))
- DVMRP
- Anycast
- MBone
- PGM  
([http://www.cisco.com/en/US/docs/ios/jpmulti/configuration/guide/imc\\_cfg\\_pgm\\_routasst\\_ps6350\\_TSD\\_Products\\_Configuration\\_Guide\\_Chapter.html](http://www.cisco.com/en/US/docs/ios/jpmulti/configuration/guide/imc_cfg_pgm_routasst_ps6350_TSD_Products_Configuration_Guide_Chapter.html))
- MOSPF (Multicast OSPF)
  - Typ 6 messages -> ignore lsa mospf
- Multicast IPv6
  - ipv6 multicast-routing
  - MLD Multicast Listener Discovery (ipv6 mld join-group ff...)

## QoS

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- TOS Byte
  - IP Precedence
  - DSCP
  - Calculations / Variations
- Quality of service solutions
- MLS
  - Trusting
- Classification and Marking
  - Using MQC
    - Using NBAR
    - Using PBR
    - Using CAR
    - QoS Policy Propagation via BGP
    - DE
      - DE List
      - MQC
  - C3550 Classifying Traffic on a Per-Port Per Vlan Basis using Class-Maps
- Congestion management, congestion avoidance
  - Legacy Congestion Management
    - Priority Queueing (PQ)
    - Custom Queueing (CQ)
    - Weighted Fair Queueing (WFQ)
  - Low Latency Queueing LLQ
  - CBWFQ
  - Legacy RED
  - WRED
  - C3550:
    - Expedite Queue
  - C3560
    - Weighted Tail Drop (WTD)
    - SRR (Shaped Round Robin)
- Policing and shaping
  - C3550 Policing
  - Policing with MQC
    - Two-Rate Policer
    - Percentage-based Policing and Shaping
  - Unconditional Packet Discard (policy-map -> drop)
  - Control Plane Policing CoPP
  - Shaping with MQC
  - CAR
  - Generic Traffic Shaping
  - FRTS
    - Fragmentation
- Signaling
  - RSVP
- Link efficiency mechanisms
  - Multilink PPP (MLP)
    - MPL Interleaving and Queueing
    - Multiclass Multilink PPP
    - FRF.16 (Multilink Framereley)
  - Header Compression
    - FRF.9 (payload compression)
    - FRF.12 (Frame-Relay Fragmentation)
    - Compressed Real-Time Protocol
    - Compression – STAC vs PREDICTOR
    - RTP Header Compression [ip rtp header-compression]
    - TCP Header Compression [ip tcp header-compression]



- Limiting Bandwidth for Specific Hosts
  - Rate-Limiting
  - Policing
  - Shaping
  - Storm-Control

## Security

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- AAA
  - Basic Config (AAA ... group ... )
  - Radius
  - Tacacs+
  - 802.1X
    - Enabling 802.1X Authentication
    - Periodic Reauthentication
    - Quiet Period
    - Host mode
    - Guest VLAN
    - Accounting
- Traffic filtering and firewalls
  - Lock & Key (dynamic ACLs)
  - Reflexive ACLs
  - TCP Intercept
  - CBAC
  - (Zone Based Firewall)
  - Using PBR (match ... set interface Null0)
  - Using MQC (match ... class X → drop)
- Access lists
  - Time-Based ACLs
  - Log-Input Option
  - Rate-Limiting Log Updates (ip access-list log-update ...)
  - Block RFC1918
  - RFC2827 Filtering (Ingress Filtering; Anti-Spoofing)
  - Block Loopback Address Space
  - VLAN Maps
  - MAC ACLs
- Routing protocols security, catalyst security
  - No service password-recovery
  - Port-Based Traffic Control
    - Storm Control
    - Protected Ports
    - Port Blocking
    - Port Security
  - Dynamic ARP Inspection (DAI)
  - VLAN Access Control Lists (VACLs)
  - Private VLANs
  - All Forms of Routing Protocol Authentication
- Other security features
  - Active vs Passive FTP
  - Smurf Attack (filter/limit echo-replies)
  - uRPF
    - ACL to forward traffic / Log
  - Privilege Levels
  - Cisco IOS Resilient Configuration  
([http://www.cisco.com/en/US/docs/ios/security/configuration/guide/sec\\_resil\\_config\\_ps6350\\_TSD\\_Products\\_Configuration\\_Guide\\_Chapter.html](http://www.cisco.com/en/US/docs/ios/security/configuration/guide/sec_resil_config_ps6350_TSD_Products_Configuration_Guide_Chapter.html))
  - Image Verification (<http://www.cisco.com/web/about/security/intelligence/iosimage.html>) [verify ... / file verify ]
  - IP Source Tracker  
([http://www.cisco.com/en/US/docs/ios/security/configuration/guide/sec\\_ip\\_srce\\_trackr\\_ps6350\\_TSD\\_Products\\_Configuration\\_Guide\\_Chapter.html](http://www.cisco.com/en/US/docs/ios/security/configuration/guide/sec_ip_srce_trackr_ps6350_TSD_Products_Configuration_Guide_Chapter.html))
  - IP Traffic Export ([http://www.cisco.com/en/US/docs/ios/12\\_3t/12\\_3t4/feature/guide/gt\\_rawip.html](http://www.cisco.com/en/US/docs/ios/12_3t/12_3t4/feature/guide/gt_rawip.html))
  - Role-Based CLI Access
  - Network Admission Control  
([http://www.cisco.com/en/US/docs/ios/security/configuration/guide/sec\\_net\\_admsn\\_ctrl\\_ps6350\\_TSD\\_Products\\_Configuration\\_Guide\\_Chapter.html](http://www.cisco.com/en/US/docs/ios/security/configuration/guide/sec_net_admsn_ctrl_ps6350_TSD_Products_Configuration_Guide_Chapter.html)) [ip admission ...]
- Security server protocols