

Planning Maintenance for Complex Networks



CCNP TSHOOT: Maintaining and Troubleshooting IP Networks

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Maintenance Models and Methodologies

A network engineer's job description can include tasks related to:

- Device installation and maintenance
- Failure response
- Network performance
- Business procedures
- Security



Benefits of Structured Maintenance over Interrupt-driven Maintenance

- Proactive vs. reactive
- Reduced network downtime
- More cost effective
- Better alignment with business objectives
- Improved network security

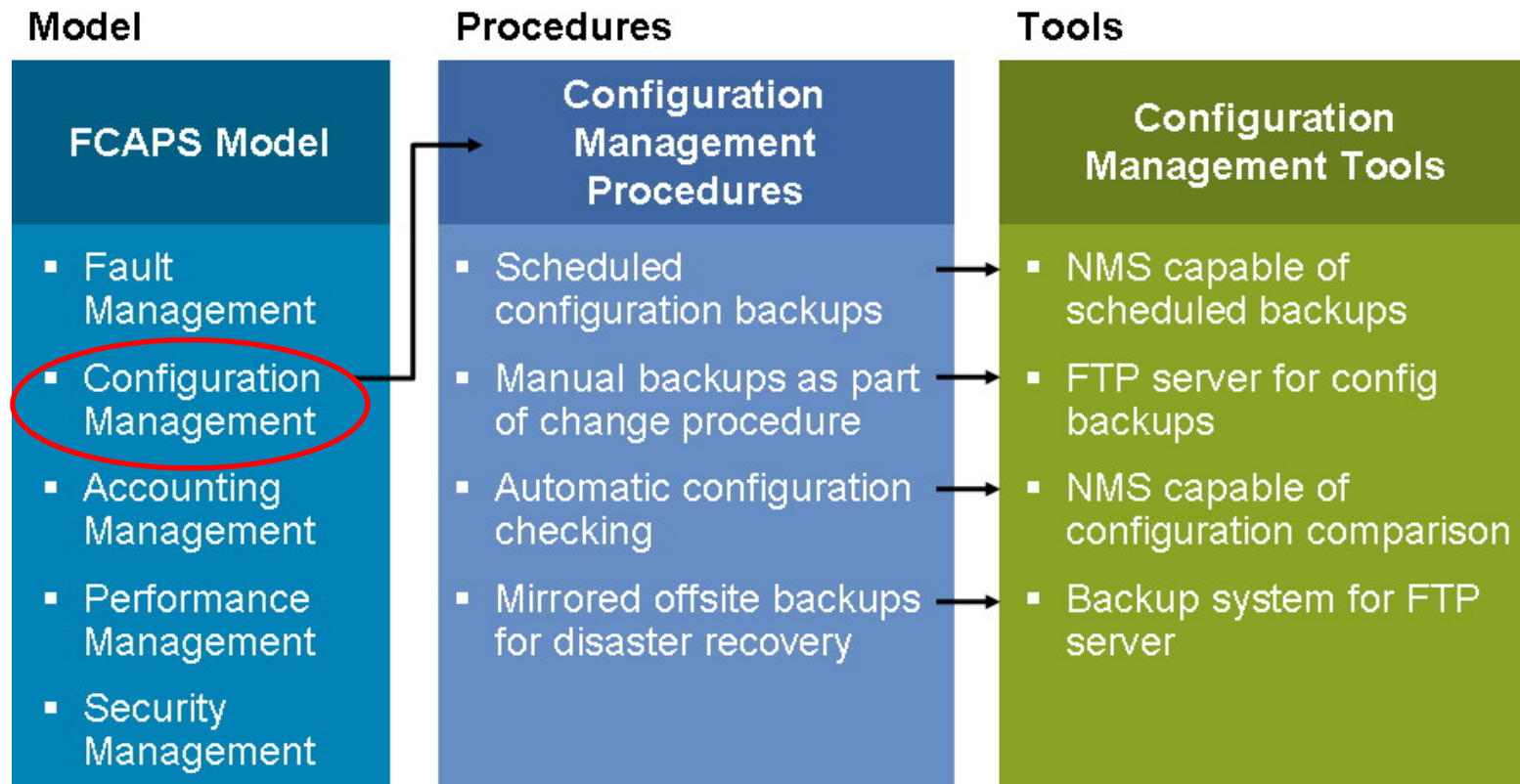


Maintenance Models and Organizations

- **IT Infrastructure Library (ITIL)**
- **ISO – FCAPS**
 - Fault management
 - Configuration management
 - Accounting management
 - Performance Management
 - Security Management
- **ITU-T - Telecommunications Management Network (TMN)**
- **Cisco Lifecycle Services Phases – PPDIOO**
(Prepare, Plan, Design, Implement, Operate, and Optimize)



The Configuration Management element of the FCAPS model





Network Maintenance Processes and Procedures

A network maintenance plan includes procedures for the following tasks:

- Accommodating Adds, Moves, and Changes
- Installation and configuration of new devices
- Replacement of failed devices
- Backup of device configurations and software
- Troubleshooting link and device failures
- Software upgrading or patching
- Network monitoring
- Performance measurement and capacity planning
- Writing and updating documentation



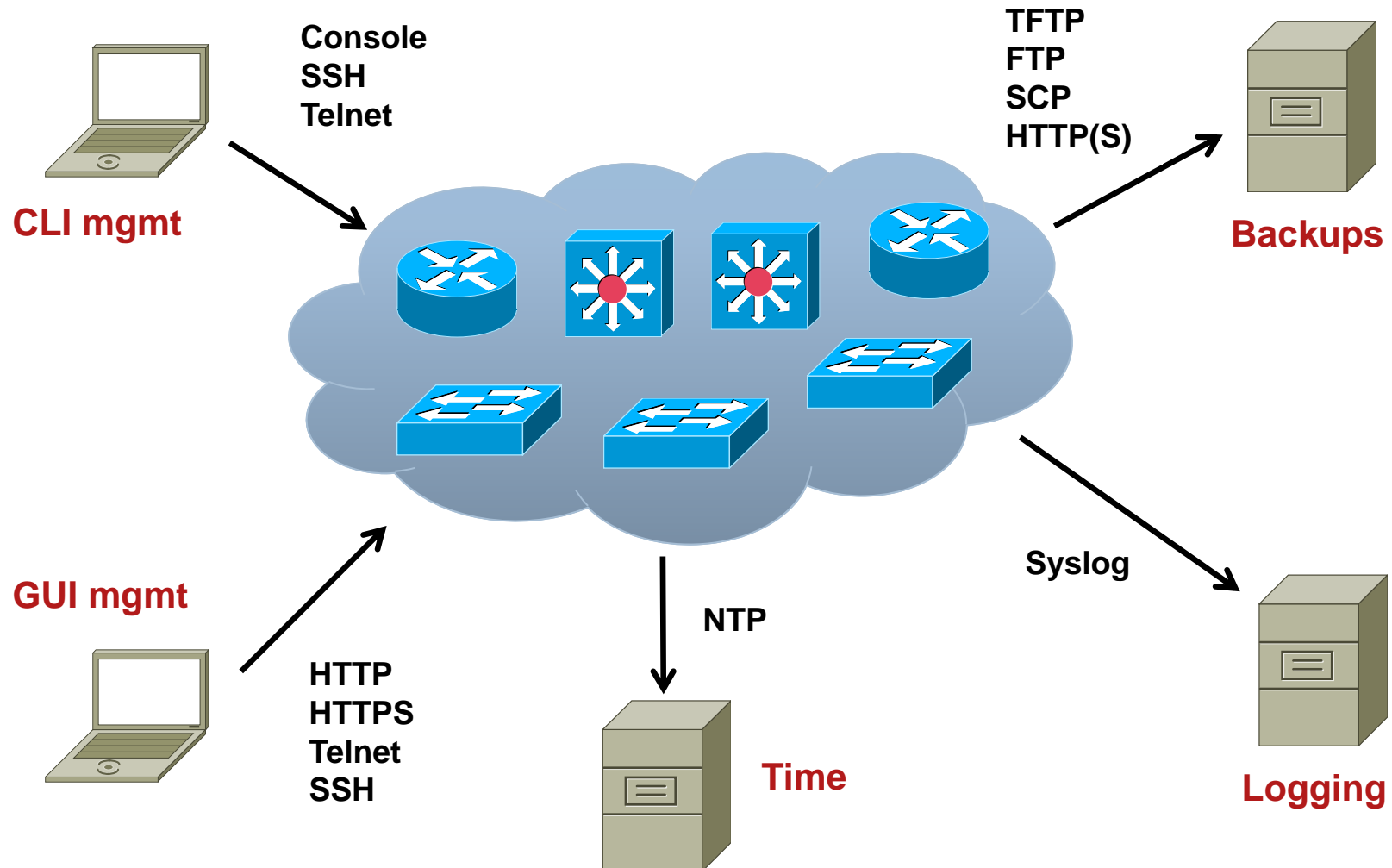
Network Maintenance Processes and Procedures

Network maintenance planning includes:

- Scheduling maintenance
- Formalizing change control procedures
- Establishing network documentation procedures
- Establishing effective communication
- Defining templates/procedures/conventions
- Planning for disaster recovery



Network Maintenance Tools, Applications, and Resources





NTP Example

(Selected output from the running config)

```

service timestamps debug datetime msec localtime show-timezone
service timestamps log datetime localtime show-timezone
!
clock timezone PST -8
clock summer-time PDT recurring 2 Sun Mar 2:00 1 Sun Nov 2:00
!
ntp server 10.1.220.3

```



Cisco Configuration and Documentation Tools

- **Dynamic Configuration Tool**
 - Aids in creating hardware configurations
 - Verifies compatibility of hardware and software selected
 - Produces a Bill of Materials (BoM) with part numbers
- **Cisco Feature Navigator**
 - Quickly finds Cisco IOS Software release for required features
- **SNMP Object Navigator**
 - Translates SNMP Object Identifiers (OID) into object names
 - Allows download of SNMP MIB files
 - Verify supported MIBs for a Cisco IOS Software version
- **Cisco Power Calculator**
 - Calculates power supply requirements a PoE hardware configuration
 - Requires CCO login



Logging Services

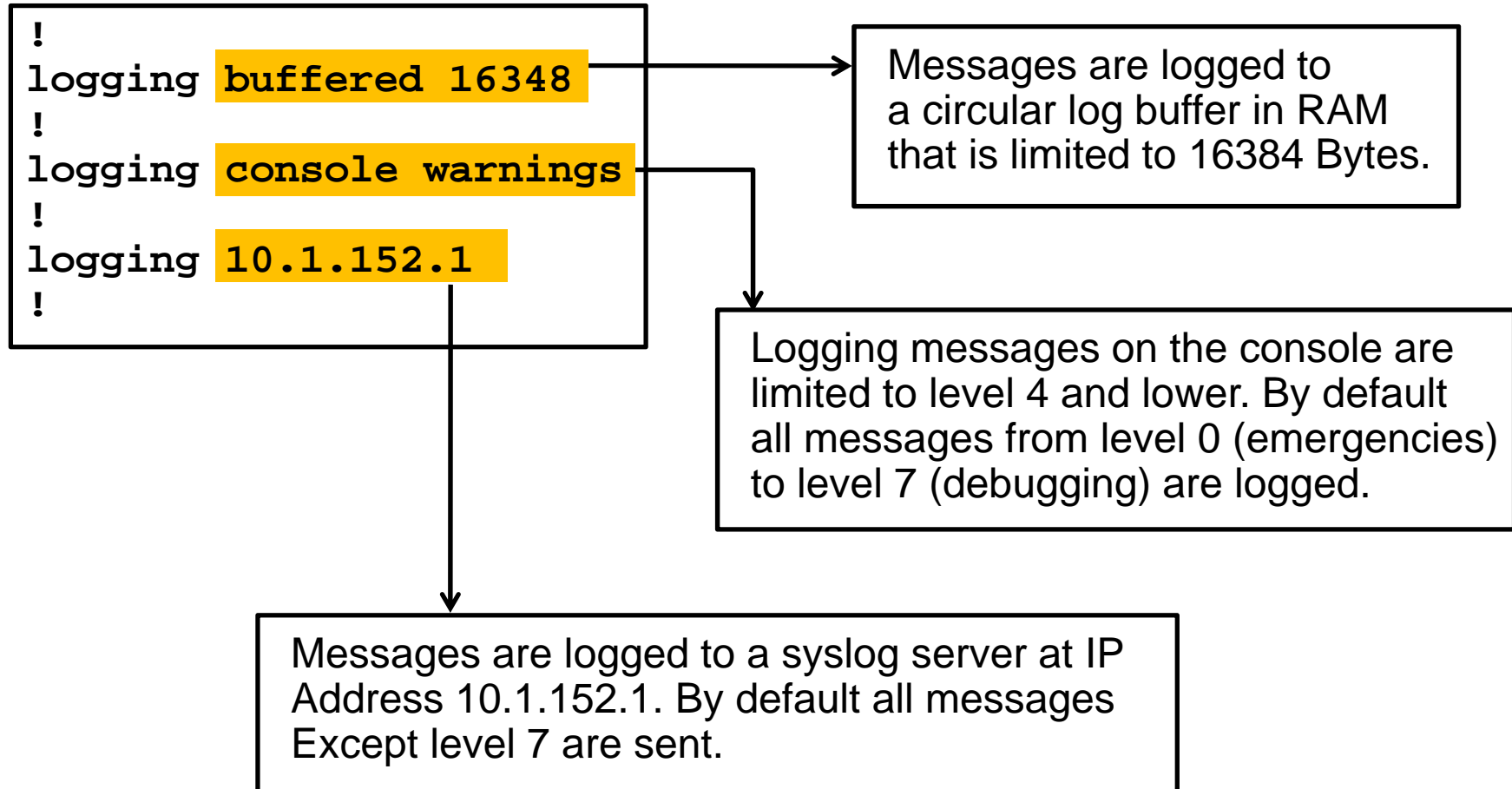
Logging severity levels on Cisco devices:

- (0) Emergencies
- (1) Alerts
- (2) Critical
- (3) Errors
- (4) Warnings
- (5) Notifications
- (6) Informational
- (7) Debugging

Enabling logging for a lower level (from importance point of view) will enable logging for all the above levels.



Logging to a Server





Network Monitoring and Performance Measurement Tools

- Capacity planning
- Diagnosing performance problems
- SLA compliance



Implementing Backup and Restore Services using FTP

- Copy using FTP with specified username and password

```
R1(config)# ip ftp username backup
R1(config)# ip ftp password san-fran
R1(config)# exit
R1# copy startup-config ftp://10.1.152.1/R1-test.cfg
Address or name of remote host [10.1.152.1]?
Destination filename [R1-test.cfg]?
Writing R1-test.cfg !
2323 bytes copied in 0.304 secs (7641 bytes/sec)
```

- Copy using FTP with stored username and password

```
R1# copy startup-config ftp://backup:san-fran@10.1.152.1/R1-test.cfg
Address or name of remote host [10.1.152.1]?
Destination filename [R1-test.cfg]?
Writing R1-test.cfg !
2323 bytes copied in 0.268 secs (8668 bytes/sec)
```



Implementing Backup and Restore Services using Archive

- Setting up the configuration archive

```
R1(config)# archive
R1(config-archive)# path flash:/config-archive/$h-config
R1(config-archive)# write-memory
R1(config-archive)# time-period 10080
```

- show archive** command output

```
R1# show archive
There are currently 3 archive configurations saved.
The next archive file will be named flash:/config-archive/R1-config-4
Archive #   Name
0
1          flash:/config-archive/R1-config-1
2          flash:/config-archive/R1-config-2
5          flash:/config-archive/R1-config-3 <- Most Recent
```



Implementing Backup and Restore Services using `configure replace`

```

R1# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)# hostname TEST
TEST(config)# ^Z
TEST# configure replace flash:config-archive/R1-config-3 list
This will apply all necessary additions and deletions
to replace the current running configuration with the
contents of the specified configuration file, which is
assumed to be a complete configuration, not a partial
configuration. Enter Y if you are sure you want to proceed. ? [no]: yes
!Pass 1
!List of Commands:
no hostname TEST
hostname R01
end
Total number of passes: 1
Rollback Done

```




Disaster Recovery Tools

Successful disaster recovery is dependent on the existence of the following:

- Up to date configuration backups
- Up to date software backups
- Up to date hardware inventories
- Configuration and software provisioning tools