



THE POWER OF BUILDING AND
MANAGING NETWORKS

Provisioning



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1 General

ERAMON Provisioning has been developed for medium to large-scale enterprises in all industries to simplify and improve the process for the roll out of new configurations and configuration changes on comprehensive WAN/LAN infrastructures.

New technologies improving quality, security as well as performance, have to be integrated cost effectively and with the least operational disruption. Running wide area network infrastructures requires dynamic adjustments of affected components, such as routers, switches, firewalls and the like. Any changes or expansions to the infrastructures usually require considerable manpower and effort beyond regular office hours. A network-wide introduction of new services such as VoIP, Quality of Service (QoS), etc., would be an example of this. It is crucial to roll out QoS profiles simultaneously and reliably to all affected components in order to ensure the continued quality of the voice connections.

Based on the experience of running their own international IP/MPLS network infrastructure, ERAMON GmbH developed, among other modules, ERAMON Provisioning. Since its launch the feedback from users and operators is continuously integrated into any further developments of this product and then made available to all ERAMON customers. This way all will benefit from one another's ideas and suggestions.

Any network components contained on the network are recorded and their configuration saved on ERAMON through scans. This function is imbedded in ERAMON Inventory. Through open and documented APIs (Application Programming Interfaces) the users themselves can install applications; ERAMON's data structures are therefore clearly shown. For this you can access ERAMON's internal configuration database via API.

2 Master Data

As a first step, all data relevant for the provisioning process is written to ERAMON's Master Database. This includes information concerning new devices already in ERAMON, existing devices or individual ports.

For example, all device types (hardware) are specified that are to be selected when provisioning for the first time and the Config templates saved. The user may define tokens within the templates, which will be replaced by real values during the actual provisioning job. A very helpful special feature is that the different token types can be automated and even assigned with interdependent links (script, free text, external data resources, etc.)

Multiple provisioning processes can be combined very flexibly as a product or service.

In addition, several hierarchical levels (CPE, PE or access layer) may be specified and taken into account.

Preparation work is thus centrally organized and processes to run provisionings are carried out automatically.



3 Provisioning Methods

3.1 Script Provisioning

- Specification of the individual commands with abort conditions

Provisioning Script Wizard Quick Help

Provisioning Script Wizard | Existing devices in ERAMON | Logging source-interface

Detailed Information

Provisioning Scripts

Position	Command	Match String	Regular Expression	Timeout	Abort	Output Type	Output Parameters	
10	conf t	#	N	10	Continue			+ x2 [icon] [X]
20	logging source-interface #source_interface#	#	N	10	Continue			+ x2 [icon] [X]
30	exit	#	N	10	Continue			+ x2 [icon] [X]
40	write	#	N	10	Continue			+ x2 [icon] [X]
50		#	N	10	Continue			+ x2 [icon] [X]
60		#	N	10	Continue			[icon] [X]

Tokens used

Token(s)	Token Description	Token Category	Token Value	Sequence		CSV
<input type="checkbox"/> source_interface	source_interface	Plain Text	lo100	10	[icon] [X]	

[icon] [X]

[icon] [icon] [icon] [icon]

Although many problems can be identified and eliminated in advance under laboratory conditions, but when problems in the course of system changes do occur in the field, it is essential to be able to limit the downtime of the affected components to a minimum with the help of equally automated disaster or config recovery procedures.

- Display when using match conditions;
- Function also possible with Config Compliance Check, however, no login on to devices with Config Compliance Check.

Script Provisioning Match Result Quick Help

Script Provisioning Match Result

Script Provisioning Match Result

Script Name	Device	Type	Match String	Status	Date	CSV
Neuer SNMP-Server eingetragen	lab_mpls_pe_02	Match Ok	*snmp-server .enable traps 172.22.160.21.*	[Red Circle]	2013-06-04 13:52:26	
Neuer SNMP-Server eingetragen	lab_mpls_core_01	Match Ok	*snmp-server .enable traps 172.22.160.21.*	[Red Circle]	2013-06-04 13:52:25	
Neuer SNMP-Server eingetragen	lab_mpls_pe_11	Match Ok	*snmp-server .enable traps 172.22.160.21.*	[Red Circle]	2013-06-04 13:52:25	
Neuer SNMP-Server eingetragen	lab_mpls_pe_12	Match Ok	*snmp-server .enable traps 172.22.160.21.*	[Red Circle]	2013-06-04 13:52:24	
Neuer SNMP-Server eingetragen	lab_mpls_pe_21	Match Ok	*snmp-server .enable traps 172.22.160.21.*	[Red Circle]	2013-06-04 13:52:24	
Neuer SNMP-Server eingetragen	lab_mpls_pe_32	Match Ok	*snmp-server .enable traps 172.22.160.21.*	[Red Circle]	2013-06-04 13:52:32	
Neuer SNMP-Server eingetragen	lab_mpls_pe_31	Match Ok	*snmp-server .enable traps 172.22.160.21.*	[Red Circle]	2013-06-04 13:52:47	
Neuer SNMP-Server eingetragen	lab_gw_01	Match Ok	*snmp-server .enable traps 172.22.160.21.*	[Red Circle]	2013-06-04 13:52:46	
Neuer SNMP-Server eingetragen	lab_mpls_eramom_11	Match Ok	*snmp-server .enable traps 172.22.160.21.*	[Red Circle]	2013-06-04 13:52:42	
Neuer SNMP-Server eingetragen	lab_mpls_eramom_21	Match Ok	*snmp-server .enable traps 172.22.160.21.*	[Red Circle]	2013-06-04 13:52:42	
Neuer SNMP-Server eingetragen	lab_mpls_eramom_31	Match Ok	*snmp-server .enable traps 172.22.160.21.*	[Red Circle]	2013-06-04 13:52:42	
Neuer SNMP-Server eingetragen	lab_mpls_eramom_32	Match Ok	*snmp-server .enable traps 172.22.160.21.*	[Red Circle]	2013-06-04 13:52:44	

Close



3.2 Port Provisioning

At this point ports can be assigned to the port profile templates that were previously specified in the master data menu. This can also be done for several ports in different devices, where the system will always display the appropriate selection masks for devices and ports in question.

If tokens were set up for the templates, these now have to be filled with actual values for each polling.

The screenshot shows the 'Device Info' window for 'lab_mpls_core_01'. A 'Port Provisioning' dialog is open, showing the 'Port Profile for Lo21342'. The 'Current Profile' is 'manuel', and the 'New Profile' is 'Port-Description setzen'. The 'Token(s)' field contains 'desc (*)'. Below the dialog, a table lists the ports on the device.

Port / Subport	Port Description	Status (A/O/I)	Customer	Bandwidth / Duplex Mode	Addresses	Station	VRF	Port Profile	Managed	EPM
Gi2/0		●●●●		1000 Mbps	mac: CA:08:10:D0:00:38 (VLAN:0)			Manual	✓	✓
Fa0/0		●●●●		100 Mbps	mac: CA:08:10:D0:00:08 (VLAN:0)			Manual	✓	✓
Fa0/1		●●●●		100 Mbps	mac: CA:08:10:D0:00:06 (VLAN:0)			Manual	✓	✓
Lo100	** Management IP for lab_mpls_core_01 **	●●●●		8000 Mbps	ipV4: 172.17.200.1/32			Manual	✓	✓
Lo200		●●●●		8000 Mbps				Manual	✓	✓
Lo21342	test	●●●●		8000 Mbps				Manual	✓	✓
PO4/0-sonet		●●●●		155 Mbps				Manual	✓	✓

3.3 Bulk Provisioning

The commands are specified in a config template; which is transferred to the device with the copy command.

The screenshot shows the 'Config Templates' window for 'HEADER cisco'. The 'Template Info' section includes: Template ID 3, Template Name HEADER cisco, Manufacturer cisco, and Template File /var/www/html/prov3-files/3.tpl. The 'Token(s)' table is as follows:

Token(s)	Token Description	Token Category	Token Value	Sequence
hostname	hostname	Plain Text		1
pw_enable	pw_enable	Global	Global Enable	1

The configuration commands for the template are:

```

!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname #hostname#
!
logging queue-limit 100
enable password #pw_enable#
!
ip subnet-zero
!
!
ip audit notify log
ip audit po max-events 100
vpdn enable
!
vpdn-group pppoe
 request-dialin
 protocol pppoe
!
!
!
!
no voice hpi capture buffer
no voice hpi capture destination
!
!
mta receive maximum-recipients 0
!

```



3.4 Token Categories

Templates can be specified with tokens as placeholders. These would then be filled when a job is set up.

- Plain Text User enters a value
- Selection Pool Custom field for selection fields
- Calculation Calculations on MySQL level
- CMDB Central Management Database
- Pool ERAMON retrieves the next available value automatically from a pool (e.g. IP pool).
- Remote Token is filled externally
- Script Any script on OS level
- Global Selection of appropriate global values
- Number Pool ERAMON retrieves the next available value automatically from a pool (e.g. VLAN pool).

4 Products

Products bundle individual provisioning processes into one. A product can consist of several steps; these are interdependent. A step is specified on to:

- existing device (Script, Port/Bulk Provisioning)
- new device (new provisioning via console)

Example:

- Step 1 CPE provisioning (initial configuration via serial and ethernet)
- Step 2 Configuration of a backup port on the PE

5 2-Person Rule (TPR)

- Provisioning processes can be authorized using the 2-Person Rule (TPR)
- There are four different levels:
 - ▶ Level 1 (without TPR)
 - ▶ Level 2 (authorization through different user)
 - ▶ Level 3 (as for level 2, but completion date has to be within a specific time period)
 - ▶ Level 4 (as for level 3, but only specific device group)
- Job Authorization
 - ▶ A user from a user group is specified during set up
 - ▶ Authorization is carried out from the job overview in the provisioning menu



6 Provisioning Engine

- Start and status of all jobs using a wizard
- Central control for new provisionings and already registered devices
- Overview of individual jobs and the status of the provisioning console
- Special provisioning applications
- NRO (Network Resource Optimizer)
- CSV Provisioning
- Firmware Manager
- Create scheduled jobs

6.1 Config Recovery

- Simultaneous recovery of multiple devices
- The device will be provisioned with the most recent config
- Recovery can be scheduled

	Device ID	Device Name	Device IP	Device Type	Status	CSV
<input type="checkbox"/>	3	lab_mpls_pe_02	172.17.200.2	cisco7206VXR	2014-06-13 02:20:22	
<input type="checkbox"/>	4	lab_mpls_core_01	172.17.200.1	cisco7206VXR	2014-06-13 02:20:18	
<input type="checkbox"/>	5	lab_mpls_pe_11	172.17.200.11	cisco7206VXR	2014-06-13 02:20:23	
<input type="checkbox"/>	6	lab_mpls_pe_12	172.17.200.12	cisco7206VXR	2014-06-13 02:20:16	



6.2 Disaster Recovery

- Recovery of device with config and firmware
- The provisioning console and Ethernet must be able to reach the device

	Device ID	Device Name	Device IP	Device Type	Status	CSV
<input type="checkbox"/>	3	lab_mpls_pe_02	172.17.200.2	cisco7206VXR	2014-06-13 02:20:22	
<input type="checkbox"/>	4	lab_mpls_core_01	172.17.200.1	cisco7206VXR	2014-06-13 02:20:18	
<input type="checkbox"/>	5	lab_mpls_pe_11	172.17.200.11	cisco7206VXR	2014-06-13 02:20:23	
<input type="checkbox"/>	6	lab_mpls_pe_12	172.17.200.12	cisco7206VXR	2014-06-13 02:20:16	

6.3 CSV Provisioning

Requirements:

- The CSV file must contain the "ERA-DEV-IP" column
- All devices from the CSV file are on ERAMON
- The user has the necessary permission for the devices
- Any plain text tokens in the provisioning script also have to be in the CSV file (column name = token name)

Provisioning Script Wizard Quick Help

Provisioning Script Wizard Existing devices in ERAMON Logging source-interface

Detailed Information

Provisioning Scripts

Position	Command	Match String	Regular Expression	Timeout	Abort	Output Type	Output Parameters	
10	conf t	#	N	10	Continue			+ x2
20	logging source-interface #source_interface#	#	N	10	Continue			+ x2
30	exit	#	N	10	Continue			+ x2
40	write	#	N	10	Continue			+ x2
50		#	N	10	Continue			+ x2
60		#	N	10	Continue			

Tokens used

	Token(s)	Token Description	Token Category	Token Value	Sequence		CSV
<input type="checkbox"/>	source_interface	source_interface	Plain Text	lo100	10		
<input checked="" type="checkbox"/>							

← + ↑ ↓

Unbenannt - Editor

Datei Bearbeiten Format Ansicht ?

```
#ERA-DEV-IP#;source_interface
10.10.10.1;lo100
10.10.10.2;lo100
10.10.10.3;lo100
10.10.10.4;lo200
10.10.10.5;lo400
```




6.4 Firmware Manager

- Definition of the requirements for each firmware
- Syntax for installing the firmware through provisioning scripts
- Firmware upgrade process:
 - Selection of devices via GUI
 - Pre-check (RAM and Flash) of the devices
 - Start of jobs

Provisioning Engine
Quick Help

Provisioning Engine
Firmware Provisioning

Parameter(s)

Job Name (*)

Start Date (*)

(*) Mandatory Field

Required: Firmware

Required (RAM)

Size (Flash)

Pre-Check: Devices

	Device ID	Device Name	Device IP	RAM (Total / Available)	Flash (Information)	Selection (Flash)
<input checked="" type="checkbox"/>	36	lab_mpls_eramon_11	172.17.201.11	● 34918048 / 14518292	<div style="display: flex; align-items: center;"> ● <div style="border: 1px solid #ccc; padding: 2px;">flash << Flash-Files >></div> </div> <div style="margin-top: 2px;"> <div style="display: flex; align-items: center;"> slot0 Insufficient storage capacity </div> <div style="display: flex; align-items: center;"> slot1 Insufficient storage capacity </div> </div>	flash ▼
<input checked="" type="checkbox"/>	39	lab_mpls_eramon_32	172.17.201.32	● 34918048 / 14686436	<div style="display: flex; align-items: center;"> ● <div style="border: 1px solid #ccc; padding: 2px;">flash << Flash-Files >></div> </div> <div style="margin-top: 2px;"> <div style="display: flex; align-items: center;"> slot0 Insufficient storage capacity </div> <div style="display: flex; align-items: center;"> slot1 Insufficient storage capacity </div> </div>	flash ▼

←
✓



6.5 IP-SLA Manager

The IP-SLA Manager facilitates a comfortable management of IP-SLA measurements. The measurements are set up in the provisioning module; they are then analyzed through the performance measurements.

Measurements are set up with their status as inactive. As soon as the relevant SAT was able to poll IP-SLA data, the status will be changed to active.

Parameters when setting up a measurement:

- Category
- Device A/B
- Time Frame from/Time Frame until
- ToS
- Thresholds Thresholds for the set up measurement

Measurements
Quick Help

New Entry

Category:

Device Group (*):

Device A (*):

Device B (*):

Time Frame from:

Time Frame until:

ToS:

Thresholds	Type	Threshold	Threshold Violations	Threshold Period	Threshold Prio	Threshold Prio (max.)	Threshold Alert Message	Event Source
	Neg. DS #OWNER# #TAG#	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="clear"/> ▼	<input type="text" value="clear"/> ▼	<input type="text"/>	<input type="text"/>
	Pos. DS #OWNER# #TAG#	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="clear"/> ▼	<input type="text" value="clear"/> ▼	<input type="text"/>	<input type="text"/>
	Response Time (ms) #OWNER# #TAG#	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="clear"/> ▼	<input type="text" value="clear"/> ▼	<input type="text"/>	<input type="text"/>
	SAA-Echo #OWNER# #TAG#	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="clear"/> ▼	<input type="text" value="clear"/> ▼	<input type="text"/>	<input type="text"/>

(*) Mandatory Field



6.6 Overview of Jobs

The user will be provided with an overview of the statuses of the current and already completed provisioning jobs, including the details – such as: who, when, what, ...

Provisioning Engine
Quick Help

Provisioning Engine
Job Status

User:

Reload Rate (in seconds):

SAT / Console: /

Product Date: /

Product Name:

Device Group:

Device Type:

Job Status:
 Not Scheduled
 Waiting for Parent
 Ready for Provisioning
 Deleted
 Running
 Provisioned
 Error
 ready for release

ID	Product Name	Status	Product Date	Number of Jobs	Action
1	Logging auf ERAMON einrichten	Provisioned	2013-05-07	8	<input type="button" value="QuickAction"/>
3	snmp ausrollen	Error	2013-05-17	8	<input type="button" value="QuickAction"/>
4	IP sla on (scheduled)	Provisioned	2013-05-22	1	<input type="button" value="QuickAction"/>
5	IP-SLA off	Provisioned	2013-05-27	1	<input type="button" value="QuickAction"/>
6	Port-Provisioning	Provisioned	2013-05-27	1	<input type="button" value="QuickAction"/>
7	syslog	Provisioned: 10 Jobs Error: 7 Jobs	2013-05-28	17	<input type="button" value="QuickAction"/>
8	sys	Provisioned: 23 Jobs Error: 28 Jobs	2013-05-28	51	<input type="button" value="QuickAction"/>

7 Practical Examples

- Due to security requirements, for example security risks which have become apparent in the current firmware, this firmware needs to be updated. Using ERAMON's Provisioning module, the firmware transfer is completed within the hour, taking about 3 to 4 minutes for each switch. For this task multiple parallel processes will be initiated on the relevant ERAMON Satellite Systems. The process is controlled remotely and centrally for all locations. It is essential to prepare for this process through an extensive test of the update mechanisms.
- A global Config change (i.e. change password) on 90 switches will take 10 minutes when carried out with ERAMON Provisioning.
- The automatic configuration of a brand new switch (e.g. Cisco) will take about 5 minutes (including firmware update). Agreed SLAs for replacing defective network components are easily met when compared to the effort required for manual updates of a switch – which normally takes about 30 to 45 minutes. ERAMON's Provisioning also enables the homogenization of network switches resulting in a standardized base configuration.
- The power supply of an access switch fails at a location (e.g. the branch of a bank) where no technicians are available; resulting in the failure of the entire switch. Once delivered, the replacement device will be connected as per instructions to a console server at that site, where it is then connected and returned to its original state in around 10 minutes by centrally located administration staff – same as for a new provisioning including the disaster recovery. Local, on-site staff can then render the device operational.

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