

Brezžično omrežje Univerze v Mariboru

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Računalniški center Univerze v Mariboru (RCUM)

Predstavitev UM

- Ustanovljena leta 1975
- 18000 študentov
- 1700 zaposlenih
- 17 fakultet
- + 2 pridruženi članici



Pedagoška fakulteta
Filozofska fakulteta
Fakulteta za naravoslovje in matematiko

Pravna fakulteta
Ekonomsko-poslovna fakulteta

Fakulteta za strojništvo
Fakulteta za gradbeništvo
Fakulteta za kemijo in kemijsko tehnologijo
Fakulteta za elektrotehniko, računalništvo in informatiko

Medicinska fakulteta

Fakulteta za zdravstvene vede



Fakulteta za kmetijske in biosistemske vede



Fakulteta za organizacijske vede

Fakulteta za logistiko

Fakulteta za energetiko

Fakulteta za varnostne vede

Fakulteta za turizem

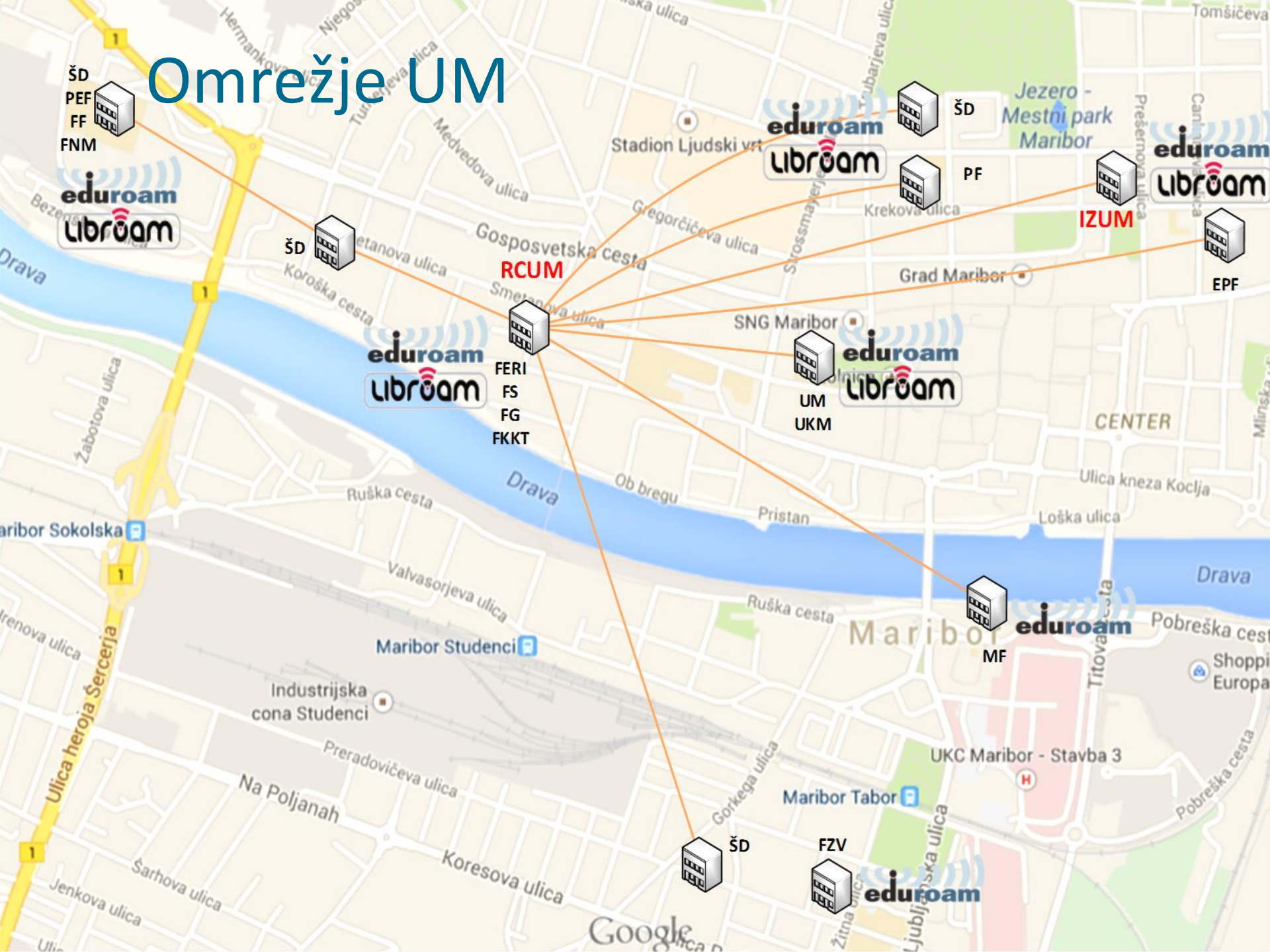




Predstavitev RCUM

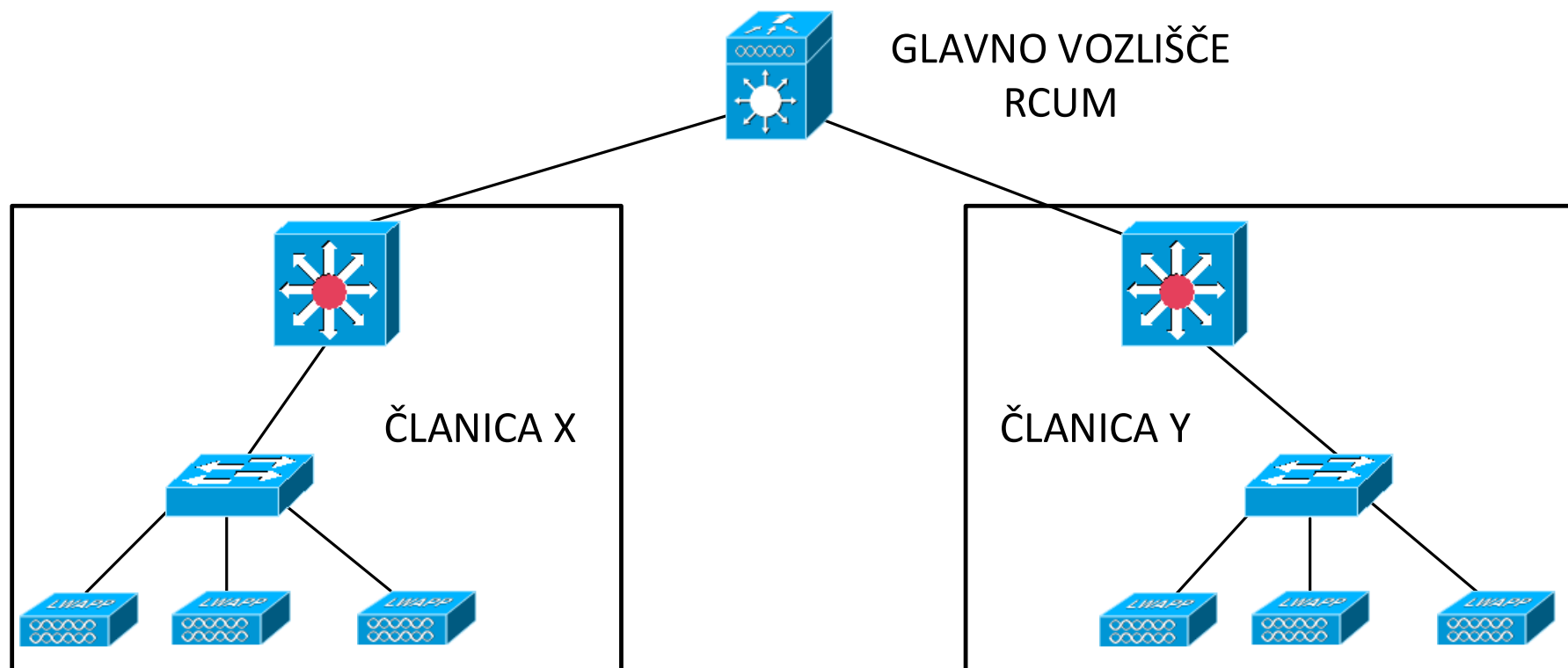
- Ustanovljen leta 1977
- Informacijska podpora akademski skupnosti
- Najpomembnejše storitve :
 - Dostop do internetnega omrežja in njegovih storitev
 - Podatkovni center UM
 - E-izobraževanje (MOODLE, AIPS)
 - Koordinacija IKT kordinatorjev

Omrežje UM

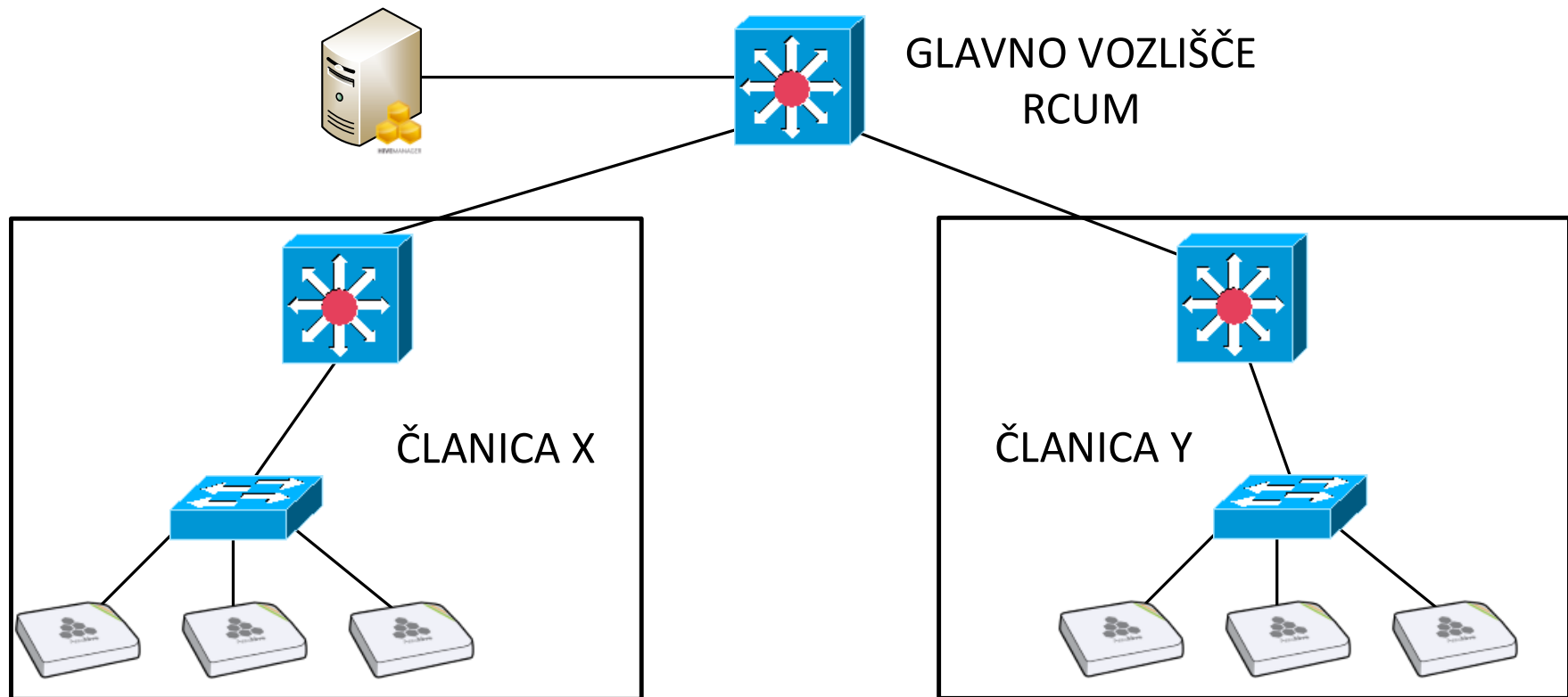




Brezžično omrežje - zdaj

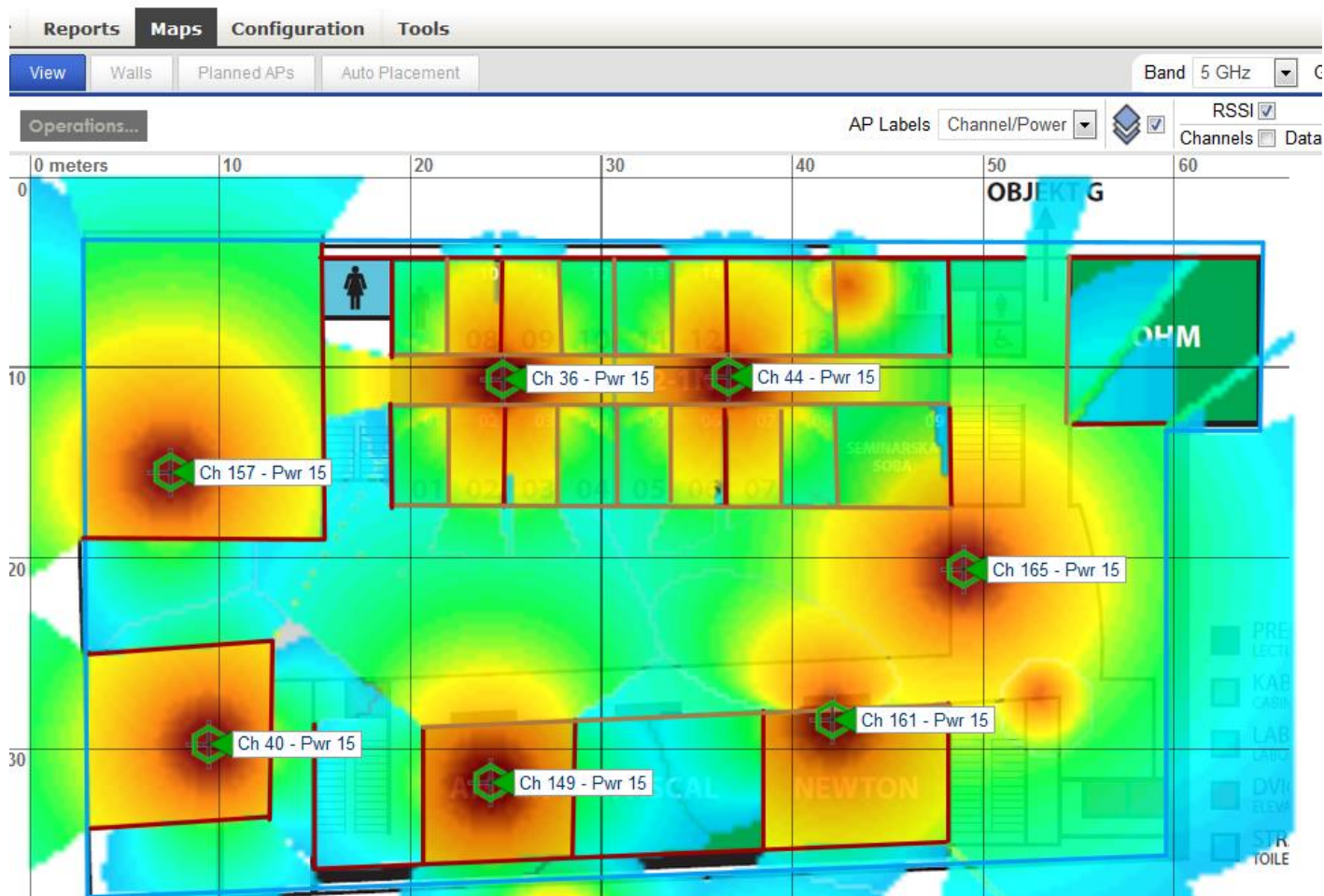


Brezžično omrežje - v prihodnje





Orodje za načrtovanje - planning tool





Priprava konfiguracij dostopnih točk

Maps Configuration Tools

Network Configuration

1 - Choose Network Policy

Define the policy-level settings for all the users and devices in a network and whether the network contains only wireless devices or wireless and routing devices.

Choose Network Policy

Aerohive
✓ RCUM

OK

New

2 - Configure Interfaces and User Access

3 - Configure and Update Devices



Modify Network Policy

×

Name* (1-32 characters)

Description (0-64 characters)

What are the networking requirements for your deployments? Select all that apply.

Wireless Access

Add guest and employee Wi-Fi access to your network.

Switching

Manage wired traffic at a site using Aerohive switches.

Branch Routing

Route your private network traffic to and from remote branch sites.

Bonjour Gateway

Enable Bonjour Gateway to allow Apple Bonjour across VLANs.

Save



Priprava konfiguracij dostopnih točk

Maps **Configuration** Tools

Network Configuration

1 - Configure Network Policy - RCUM

2 - Configure Interfaces and User Access Save

Configure network access, user authentication, and security for the selected network policy.

SSIDs Choose

Name (Access Type)	Authentication	User Profile	VLAN
eduroam eduroam WPA/WPA2 802.1X (Enterprise)	RADIUS	EDUROAM (default) Add/Remove	eduroamVLAN Assign VLAN
libroam libroam WPA/WPA2 802.1X (Enterprise)	RADIUS	LIBROAM (default) Add/Remove	libroamVLAN Assign VLAN
WiGuestUM WiGuestUM WPA/WPA2 PSK (Personal)		GUEST (default) Add/Remove	GuestVLAN Assign VLAN

Management and Native VLAN Settings Edit

MGT Interface VLAN MgmtVLAN Native (Untagged) VLAN MgmtVLAN



Priprava konfiguracij dostopnih točk

The screenshot displays the 'Network Configuration' interface with the '3 - Configure and Update Devices' step selected. A table lists four devices with columns for Online status, Name, MAC Address, Mgt0 Interface, Network Policy, Version, Updated, and Update Status. An 'Update Devices' dialog box is open, showing the number of devices to be updated (2) and configuration options for HiveOS.

Network Configuration

1 - Configure Network Policy - RCUM

2 - Configure Interfaces and User Access

3 - Configure and Update Devices

Upload the network policy and any necessary files, certificates, and user accounts to the selected devices. [Settings](#)

For a complete device configuration table, see [Configuration > All Devices](#).
For detailed upload results, see [Configuration > Device Update Results](#).

Devices to Update [Update](#) [Modify](#) [Reboot](#) [Tools...](#) **Filter** Current/Default Policy: [+](#) [-](#) [x](#)

<input type="checkbox"/>	Online	Name	MAC Address	Mgt0 Interface	Network Policy	Version	Updated	Update Status
<input type="checkbox"/>	<input checked="" type="checkbox"/>	AP-1	00:00:00:00:00:00	eth0	RCUM	6.2r1		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	AP-2	00:00:00:00:00:00	eth0	RCUM	6.2r1		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	AP-3	00:00:00:00:00:00	eth0	RCUM	6.2r1		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	AP-4	00:00:00:00:00:00	eth0	RCUM	6.2r1		

Total: 4 Items per page: 15

Update Devices

Number of Devices to Update: **2**

Configuration

The number of devices whose configurations will be updated: **2**

HiveManager automatically determines if a device requires a complete or partial update. However, you can override this choice.

Perform a complete configuration update for all selected devices

Note: Rebooting a device is necessary to activate a complete update but is unnecessary for a partial update.

HiveOS

Number of devices on which HiveOS will be upgraded: **0**

Upgrade even if the HiveOS versions are the same

[Update](#) [Cancel](#) [Advanced controls are available at Device Update Options](#)

Updated Update Status

Updated	Update Status
12/02/2014 11:40:01 AM	
12/02/2014 11:40:01 AM	
12/02/2014 11:39:32 AM	

Total: 4 Items per page: 15



Priprava konfiguracij dostopnih točk

Network Configuration

- 1 - Configure Network Policy - RCUM
- 2 - Configure Interfaces and User Access
- 3 - Configure and Update Devices

Upload the network policy and any necessary files, certificates, and user accounts to the selected devices.
 For a complete device configuration table, see [Configuration > All Devices](#).
 For detailed upload results, see [Configuration > Device Update Results](#).

Devices to Update Filter: Current/Default Policy:

<input type="checkbox"/>	Online	Name	MAC Address	Mgt0 Interface	Network Policy	Version	Updated	Update Status
<input type="checkbox"/>		WAP001	08:00:27:00:00:00	eth0/0/1	RCUM	6.2r1		12/02/2014 09:32:12 PM
<input type="checkbox"/>		WAP002	08:00:27:00:00:00	eth0/0/1	RCUM	6.2r1		12/02/2014 09:32:10 PM
<input type="checkbox"/>		WAP003	08:00:27:00:00:00	eth0/0/1	RCUM	6.2r1		12/02/2014 09:32:10 PM

Monitor Reports Maps Configuration Tools devd.com/umsl Log Out

Device Update Results

Total: 10 Items per page: 15 1 / 1

<input type="checkbox"/>	Host Name	Node ID	Mgt0 Interface	Update Type	Update Start Time	Update Finish Time	Upload Rate	Current State	Action	Update Result	Description	Virtual
<input type="checkbox"/>	WAP001	08:00:27:00:00:00	eth0/0/1	Upload Configuration (Wizard)	12/02/2014 09:32:05 PM	12/02/2014 09:32:12 PM	100%	Success		Successful	Upload Configuration: The config has be...	home
<input type="checkbox"/>	WAP002	08:00:27:00:00:00	eth0/0/1	Upload Configuration (Wizard)	12/02/2014 09:32:05 PM	12/02/2014 09:32:10 PM	100%	Success		Successful	Upload Configuration: The config has be...	home
<input type="checkbox"/>	WAP003	08:00:27:00:00:00	eth0/0/1	Upload Configuration (Wizard)	12/02/2014 09:32:05 PM	12/02/2014 09:32:11 PM	100%	Success		Successful	Upload Configuration: The config has be...	home
<input type="checkbox"/>	WAP004	08:00:27:00:00:00	eth0/0/1	Upload Configuration (Wizard)	12/02/2014 09:32:05 PM	12/02/2014 09:32:10 PM	100%	Success		Successful	Upload Configuration: The config has be...	home
<input type="checkbox"/>	WAP005	08:00:27:00:00:00	eth0/0/1	Upload Configuration (Wizard)	12/02/2014 11:39:54 AM	12/02/2014 11:40:01 AM	100%	Success		Successful	Upload Configuration: The config has be...	home



Prikaz naprav in uporabnikov

Managed Devices **Unmanaged Devices**

All Devices Auto Refresh Every 30 seconds

Total: 6 Items per page: 15

Modify Update... Utilities... Reassign... Device Inventory...

Audit	Host Name	Alarm	Mgt0 Interface	External IP Address	Topology Map	Node ID	Connection	Device Mode	Clients	Uptime	HiveOS	Device Function	App Signature File	Virtual HiveManager
<input type="checkbox"/>	[Host Name]	<input checked="" type="checkbox"/>	[Interface]	[IP Address]	[Map]	[Node ID]	[Connection]	Portal	1	38 Days, 7 Hrs 39 Mins 45 Secs	HiveOS 6.2r1a.1931	AP	ver 4.0.2	[VM Icon]
<input type="checkbox"/>	[Host Name]	<input checked="" type="checkbox"/>	[Interface]	[IP Address]	[Map]	[Node ID]	[Connection]	Portal	0	38 Days, 11 Hrs 34 Mins 46 Secs	HiveOS 6.2r1a.1931	AP	ver 4.0.2	[VM Icon]
<input type="checkbox"/>	[Host Name]	<input checked="" type="checkbox"/>	[Interface]	[IP Address]	[Map]	[Node ID]	[Connection]	Portal	1	8 Days, 1 Hrs 32 Mins 13 Secs	HiveOS 6.2r1a.1931	AP	ver 4.0.2	[VM Icon]
<input type="checkbox"/>	[Host Name]	<input checked="" type="checkbox"/>	[Interface]	[IP Address]	[Map]	[Node ID]	[Connection]	Portal	3	14 Days, 5 Hrs 48 Mins 32 Secs	HiveOS 6.2r1a.1931	AP	ver 4.0.2	[VM Icon]
<input type="checkbox"/>	[Host Name]	<input checked="" type="checkbox"/>	[Interface]	[IP Address]	[Map]	[Node ID]	[Connection]	Portal	3	14 Days, 11 Hrs 53 Mins 23 Secs	HiveOS 6.2r1a.1931	AP	ver 4.0.2	[VM Icon]
<input type="checkbox"/>	[Host Name]	<input checked="" type="checkbox"/>	[Interface]	[IP Address]	[Map]	[Node ID]	[Connection]	Portal	0	9 Hrs 40 Mins 53 Secs	HiveOS 6.2r1.1924	AP	ver 4.0.2	[VM Icon]

Active Clients Auto Refresh Every 30 seconds

Operation... Modify Settings...

Health	MAC Address	Local IP Address	NAT IP Address	Host Name	User Name	Client OS	Location	VLAN	Type	Last Two Hours Data	Session Start Time	Device Name	RSSI	Signal-to-Noise ratio	SSID/Security
<input type="checkbox"/>	[MAC]	[IP]		android-0dc8f360d91dd2e	[User]	Android		1*	wireless		11/12/2014 09:49:25 AM	[Device]	-83 dBm	11 dB	eduroam
<input type="checkbox"/>	[MAC]	[IP]		android-9d80c759b780a162	[User]	Android		1*	wireless		11/24/2014 11:40:27 AM	[Device]	-80 dBm	14 dB	eduroam
<input type="checkbox"/>	[MAC]	[IP]		android-a909800e77691539	[User]	Android		1*	wireless		11/24/2014 03:00:31 PM	[Device]	-79 dBm	16 dB	eduroam
<input type="checkbox"/>	[MAC]	[IP]		android-65d405cb2d4e5e53	[User]	Android		1*	wireless		11/25/2014 10:06:59 AM	[Device]	-78 dBm	12 dB	WiGuestUM
<input type="checkbox"/>	[MAC]	[IP]		acer-6e40e97492	[User]	Windows XP		1	wireless	1.93 GB	12/02/2014 08:59:58 AM	[Device]	-40 dBm	54 dB	WiGuestUM
<input type="checkbox"/>	[MAC]	[IP]		android-6b3cd27926bde9b	[User]	Android		1	wireless		12/02/2014 09:42:14 AM	[Device]	-83 dBm	32 dB	eduroam
<input type="checkbox"/>	[MAC]	[IP]		android-5fd8c4031d4fb0a	[User]	Android		1	wireless		12/02/2014 07:17:15 PM	[Device]	-83 dBm	12 dB	eduroam



Nadzorna plošča

Applications x Troubleshooting +

Time Duration: 1 Hour 8 Hours 1 Day 7 Days

All Applications by Usage

Application	Last Calendar Day	Last 7 Days	Application Group
BITTORRENT	56.61 GB	372.35 GB	File Transfer
HTTP	20.18 GB	67.87 GB	Web Services
SSL	8.18 GB	40.32 GB	Web Services
STEAM CLIENT	11.65 GB	36.52 GB	Games
UDP	7.07 GB	32.89 GB	Networking
FACEBOOK	5.96 GB	21.74 GB	Social Networking
BLIZZARD GAME DATA FILES	1712.18 MB	21.54 GB	Games
AKAMAI	3.52 GB	15.71 GB	Web Services
FTP DATA	585.70 KB	15.19 GB	File Transfer
BLIZZARD.COM WEBSITE	789.57 MB	13.46 GB	Games
TCP	1179.40 MB	10.66 GB	Networking
GOOGLE	2.40 GB	10.56 GB	Web Services

Top 10 Applications by Usage - Summary

Report Period: Nov 25, 2014, 12:00AM - Dec 2, 2014, 12:00AM

- 318.00GB BITTORRENT
- 65.00GB HTTP
- 39.13GB SSL
- 34.23GB STEAM CLIENT
- 28.16GB UDP
- 21.52GB BLIZZARD GAME DATA FILES
- 20.00GB FACEBOOK
- 15.19GB FTP DATA
- 14.37GB AKAMAI
- 13.46GB BLIZZARD.COM WEBSITE

Top 20 Applications by Usage

Report Period: Nov 25, 2014, 12:00AM - Dec 2, 2014, 12:00AM

Application	Usage	Usage Percentage	# of Users
BITTORRENT	318.00 GB	46.78%	285
HTTP	65.00 GB	9.56%	1222
SSL	39.13 GB	5.75%	1365
STEAM CLIENT	34.23 GB	5.03%	17
UDP	28.16 GB	4.14%	652
BLIZZARD GAME DATA FILES	21.52 GB	3.16%	7
FACEBOOK	20.00 GB	2.94%	1188
FTP DATA	15.19 GB	2.23%	12
AKAMAI	14.37 GB	2.11%	692
BLIZZARD.COM WEBSITE	13.46 GB	1.98%	5
OTHERS	11.29 GB	1.66%	1501
GOOGLE DOCS	10.62 GB	1.56%	237
BITS	9.90 GB	1.45%	145

Top 20 Users by Application Usage

Report Period: Nov 25, 2014, 12:00AM - Dec 2, 2014, 12:00AM

User	Usage
...	25.44 GB
...	22.46 GB
...	22.28 GB
...	18.39 GB
...	17.13 GB
...	16.87 GB
...	16.34 GB

Top 10 Arohive Devices by Wi-Fi Client Usage

Report Period: Nov 25, 2014, 12:00AM - Dec 2, 2014, 12:00AM

- 2.4 GHz
- 5 GHz

Unique Wi-Fi Clients by OS over Time

Report Period: Nov 25, 2014, 12:00AM - Dec 2, 2014, 12:00AM

- Android
- Chrome
- Linux
- MacOS
- Windows
- iPod/iPhone/iPad
- unknown



Client Monitor

Client Monitor

New Remove Show Log

Client MAC Address: aabbccdd

Client Location: [Dropdown]

Associated Device: [Dropdown]

Advanced Options

Report client performance information

Add Cancel

Order log entries by: Log Message Time

Aerohive NETWORKS

Home Dashboard Monitor Reports Maps Configuration Tools

Tools

- Planning Tool
- Client Monitor**
- VLAN Probe
- Device and Client Simulator
- Server Access Tests

Associated Device	Recent Event of Interest	Filter Probe
[Icon]	Sta(at if=wifi1.3) is de-authenticated because of r	<input type="checkbox"/>

Client Monitor

New Remove Show Log

Start/Stop	Client MAC Address	Associated Device	Recent Event of Interest	Filter Probe
Start	[Icon]	[Icon]	IP [Icon] assigned for station	<input type="checkbox"/>

Status/Log Messages

Order log entries by: Client MAC Address Level Detail Line 100

Pause Clear Export

Time	Level	Message
09:21:57 PM	BASIC	(119)Rx assoc req (rxssi 57dB)
09:21:57 PM	BASIC	(120)Tx assoc resp <accept> (status 0, pr
09:21:57 PM	INFO	(121)IEEE802.1X auth is starting (at if=w
09:21:58 PM	DETAIL	(122)Send message to RADIUS Server([i
09:21:58 PM	DETAIL	(123)Receive message from RADIUS Server:
09:21:58 PM	DETAIL	(124)Send message to RADIUS Server([i
09:21:58 PM	DETAIL	(125)Receive message from RADIUS Server:
09:21:58 PM	DETAIL	(126)Send message to RADIUS Server([i
09:21:58 PM	DETAIL	(127)Receive message from RADIUS Server:
09:21:58 PM	DETAIL	(128)Send message to RADIUS Server([i
09:21:58 PM	DETAIL	(129)Receive message from RADIUS Server:
09:21:58 PM	DETAIL	(130)Send message to RADIUS Server([i
09:21:58 PM	DETAIL	(131)Receive message from RADIUS Server:
09:21:58 PM	DETAIL	(132)Send message to RADIUS Server([i
09:21:58 PM	DETAIL	(133)Receive message from RADIUS Server:
09:21:58 PM	DETAIL	(134)Send message to RADIUS Server([i
09:21:58 PM	DETAIL	(135)Receive message from RADIUS Server:
09:21:58 PM	INFO	(136)Sending 1/4 msg of 4-Way Handshake (
09:21:58 PM	INFO	(137)Received 2/4 msg of 4-Way Handshake (
09:21:58 PM	INFO	(138)Sending 3/4 msg of 4-Way Handshake (
09:21:58 PM	INFO	(139)Received 4/4 msg of 4-Way Handshake (
09:21:58 PM	INFO	(140)PTK is set (at if=wifi0.2)
09:21:58 PM	BASIC	(141)Authentication is successfully finis
09:21:58 PM	INFO	(142)station sent out DHCP REQUEST messag



Client Monitor - log

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[00:00:00.000] BASIC (120)Tx assoc resp <accept> (status 0, pwr 11dBm)
[00:00:00.000] INFO (121)IEEE802.1X auth is starting (at if=wifi0.2)
[00:00:00.000] DETAIL (122)Send message to RADIUS Server(apolon.um.si): code=1 (Access-Request) identifier=66 length=168, User-Name=L... NAS-IP-Address=10.0.0.1 Called-!
[00:00:00.000] DETAIL (123)Receive message from RADIUS Server: code=11 (Access-Challenge) identifier=66 length=64
[00:00:00.000] DETAIL (124)Send message to RADIUS Server(apolon.um.si): code=1 (Access-Request) identifier=67 length=369, User-Name=d... NAS-IP-Address=10.0.0.1 Called-!
[00:00:00.000] DETAIL (125)Receive message from RADIUS Server: code=11 (Access-Challenge) identifier=67 length=1090
[00:00:00.000] DETAIL (126)Send message to RADIUS Server(apolon.um.si): code=1 (Access-Request) identifier=68 length=171, User-Name=L... NAS-IP-Address=10.0.0.1 Called-!
[00:00:00.000] DETAIL (127)Receive message from RADIUS Server: code=11 (Access-Challenge) identifier=68 length=1090
[00:00:00.000] DETAIL (128)Send message to RADIUS Server(apolon.um.si): code=1 (Access-Request) identifier=69 length=171, User-Name=L... NAS-IP-Address=10.0.0.1 Called-!
[00:00:00.000] DETAIL (129)Receive message from RADIUS Server: code=11 (Access-Challenge) identifier=69 length=1090
[00:00:00.000] DETAIL (130)Send message to RADIUS Server(apolon.um.si): code=1 (Access-Request) identifier=70 length=171, User-Name=d... NAS-IP-Address=10.0.0.1 Called-!
[00:00:00.000] DETAIL (131)Receive message from RADIUS Server: code=11 (Access-Challenge) identifier=70 length=850
[00:00:00.000] DETAIL (132)Send message to RADIUS Server(apolon.um.si): code=1 (Access-Request) identifier=71 length=305, User-Name=L... NAS-IP-Address=10.0.0.1 Called-!
[00:00:00.000] DETAIL (133)Receive message from RADIUS Server: code=11 (Access-Challenge) identifier=71 length=127
[00:00:00.000] DETAIL (134)Send message to RADIUS Server(apolon.um.si): code=1 (Access-Request) identifier=72 length=293, User-Name=L... NAS-IP-Address=10.0.0.1 Called-!
[00:00:00.000] DETAIL (135)Receive message from RADIUS Server: code=2 (Access-Accept) identifier=72 length=178
[00:00:00.000] INFO (136)Sending 1/4 msg of 4-way Handshake (at if=wifi0.2)
[00:00:00.000] INFO (137)Received 2/4 msg of 4-way Handshake (at if=wifi0.2)
[00:00:00.000] INFO (138)Sending 3/4 msg of 4-way Handshake (at if=wifi0.2)
[00:00:00.000] INFO (139)Received 4/4 msg of 4-way Handshake (at if=wifi0.2)
[00:00:00.000] INFO (140)PTK is set (at if=wifi0.2)
[00:00:00.000] BASIC (141)Authentication is successfully finished (at if=wifi0.2)
[00:00:00.000] INFO (142)station sent out DHCP REQUEST message
[00:00:00.000] INFO (143)DHCP server sent out DHCP ACKNOWLEDGE message to station
[00:00:00.000] BASIC (144)DHCP session completed for station
[00:00:00.000] BASIC (145)IP 10.0.0.10 assigned for station
[00:00:00.000] INFO (146)Rx <broadcast> probe req (rssi 55dB)

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[00:00:00.000] BASIC (3127)Tx assoc resp <accept> (status 0, pwr 11dBm)
[00:00:00.000] INFO (3128)WPA-PSK auth is starting (at if=wifi1.3)
[00:00:00.000] INFO (3129)Sending 1/4 msg of 4-way Handshake (at if=wifi1.3)
[00:00:00.000] INFO (3130)Received 2/4 msg of 4-way Handshake (at if=wifi1.3)
[00:00:00.000] INFO (3131)Sending 3/4 msg of 4-way Handshake (at if=wifi1.3)
[00:00:00.000] INFO (3132)Received 4/4 msg of 4-way Handshake (at if=wifi1.3)
[00:00:00.000] INFO (3133)PTK is set (at if=wifi1.3)
[00:00:00.000] BASIC (3134)Authentication is successfully finished (at if=wifi1.3)
[00:00:00.000] INFO (3135)station sent out DHCP DISCOVER message
[00:00:00.000] INFO (3136)DHCP server sent out DHCP OFFER message to station
[00:00:00.000] INFO (3137)station sent out DHCP REQUEST message
[00:00:00.000] INFO (3138)DHCP server sent out DHCP ACKNOWLEDGE message to station
[00:00:00.000] BASIC (3139)DHCP session completed for station
[00:00:00.000] BASIC (3140)IP 10.0.0.10 assigned for station
[00:00:00.000] DETAIL (3141)Rx <broadcast> probe req (rssi 42dB)
[00:00:00.000] BASIC (3142)Tx probe resp (pwr 11dBm)

```

Vprašanja



Hvala za vašo pozornost !