



MREŽA ZNANJA

Ljubljana, 11.–13. oktober 2022

Virtual LAN (VLAN)

Damjan Ferlič
OŠ Franja Malgaja Šentjur



VSEBINA

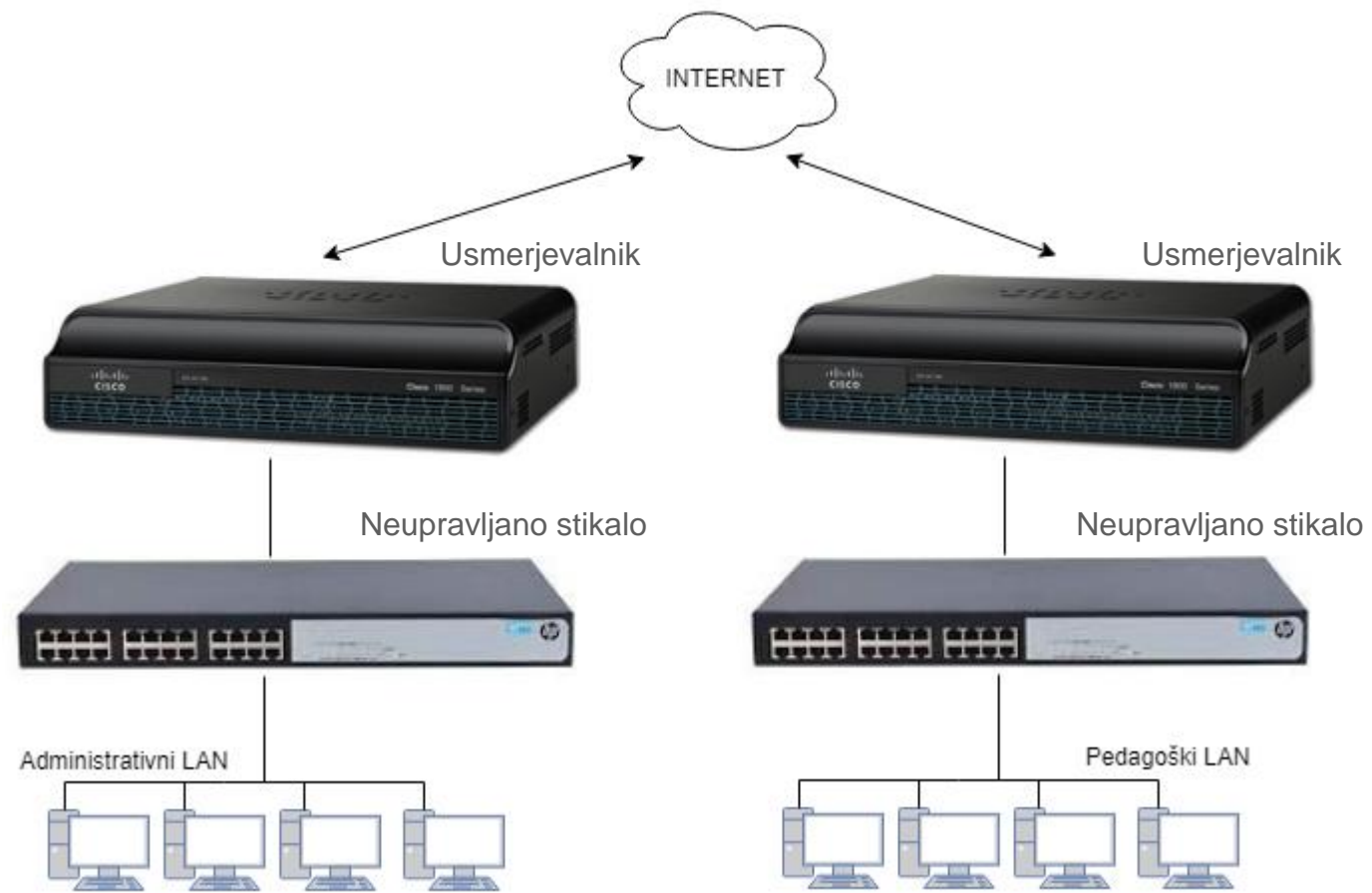
- Pregled primerov shem omrežij in vpeljava VLAN-ov.
- Zakaj uporabiti VLAN-e.
- Malo teorije in definicija pojmov.
- Primeri nastavitve VLAN-ov na stikalih.

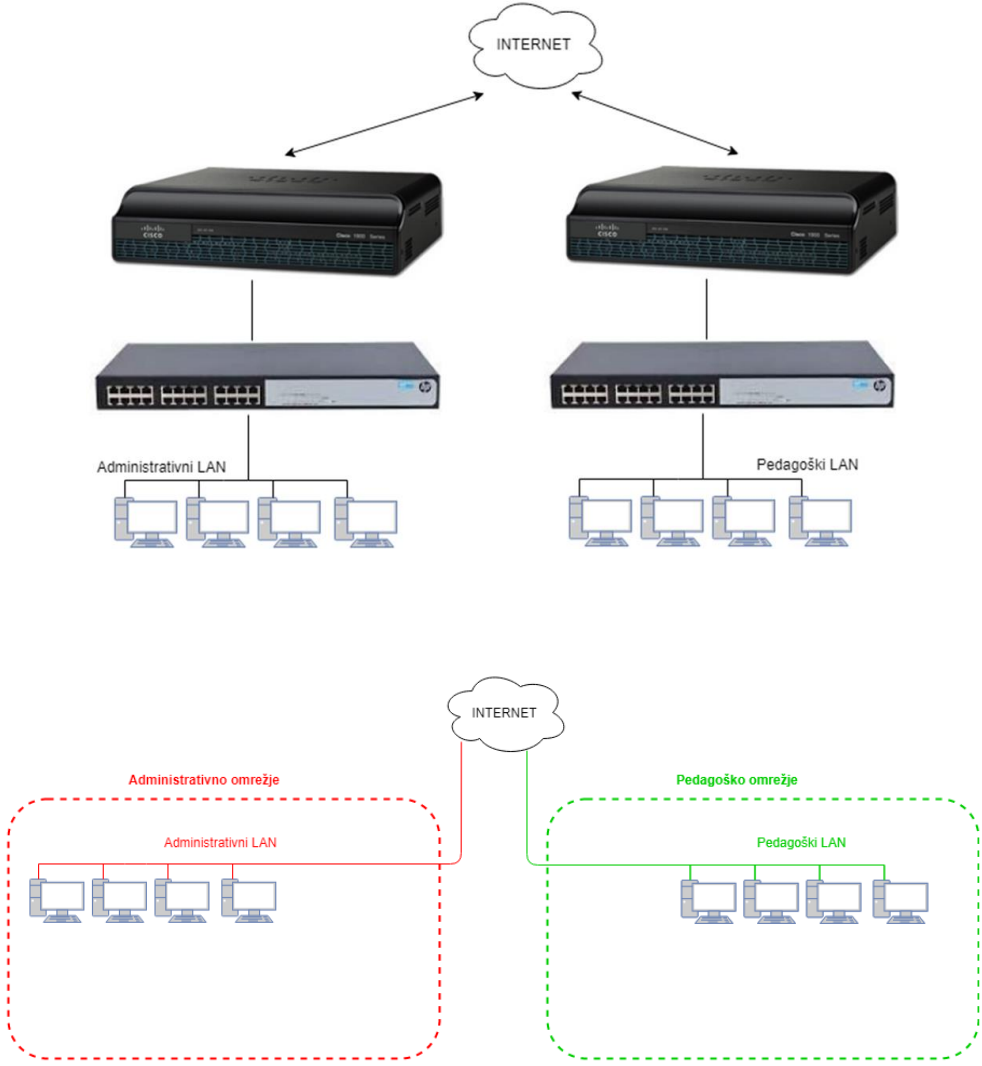


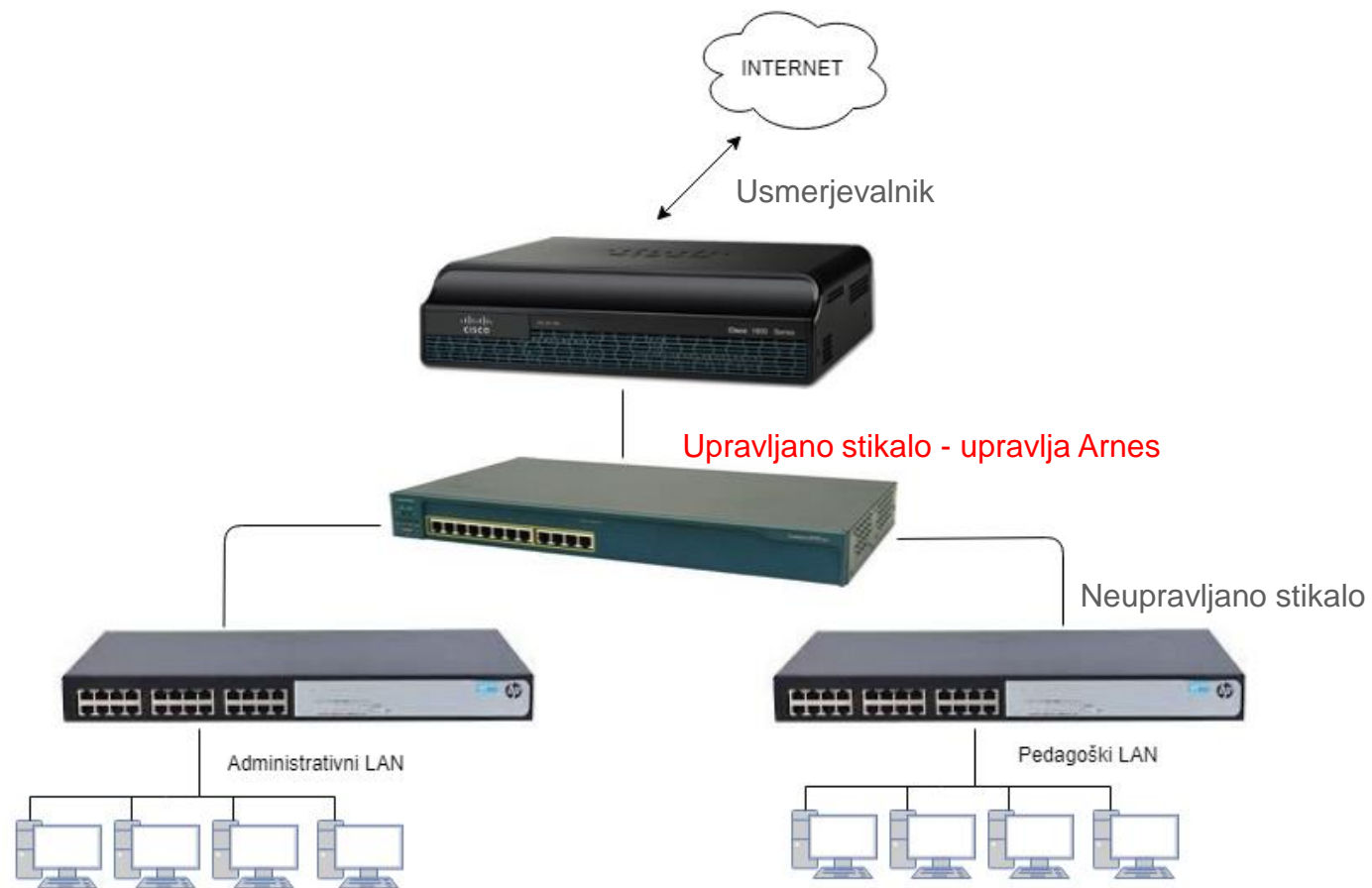
Usmerjevalnik

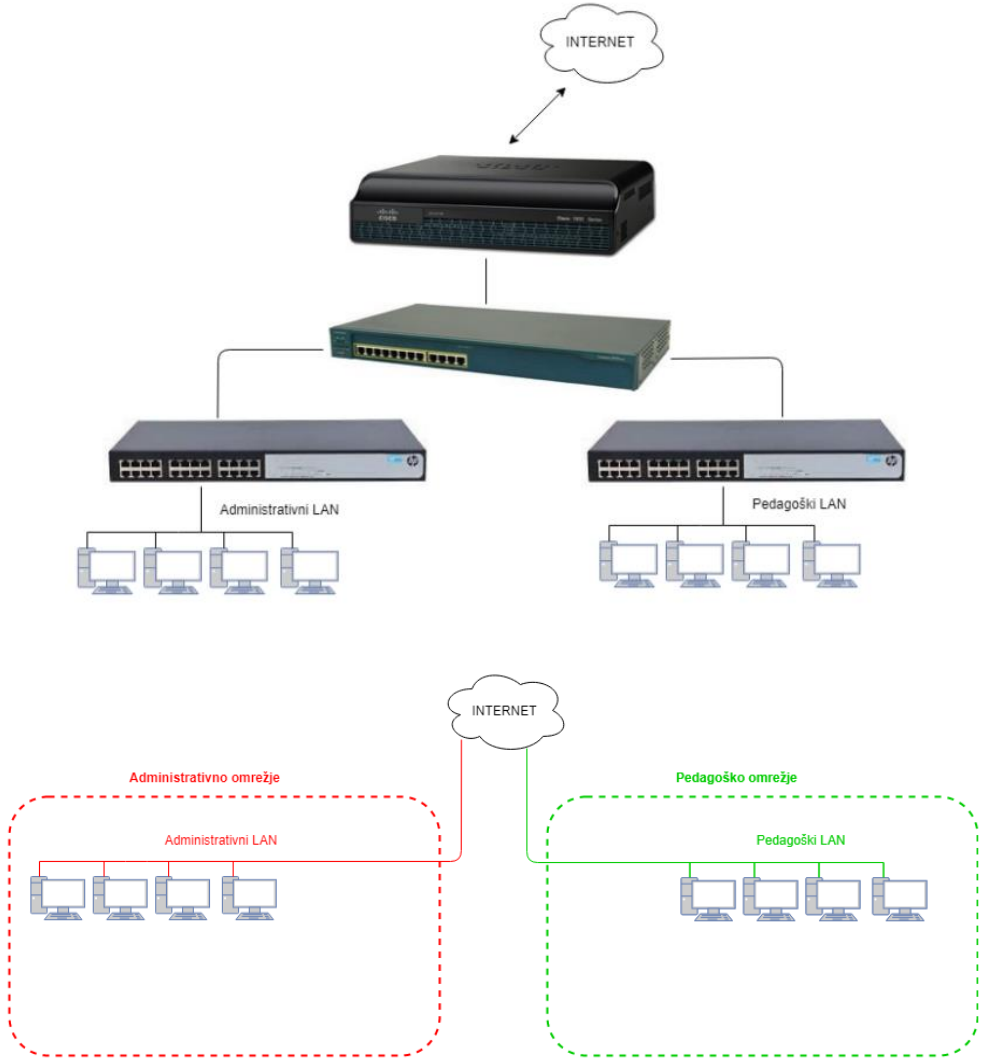
Neupravljano stikalo
(unmanaged switch, dummy switch, ...)

Računalniki in druge mrežne naprave

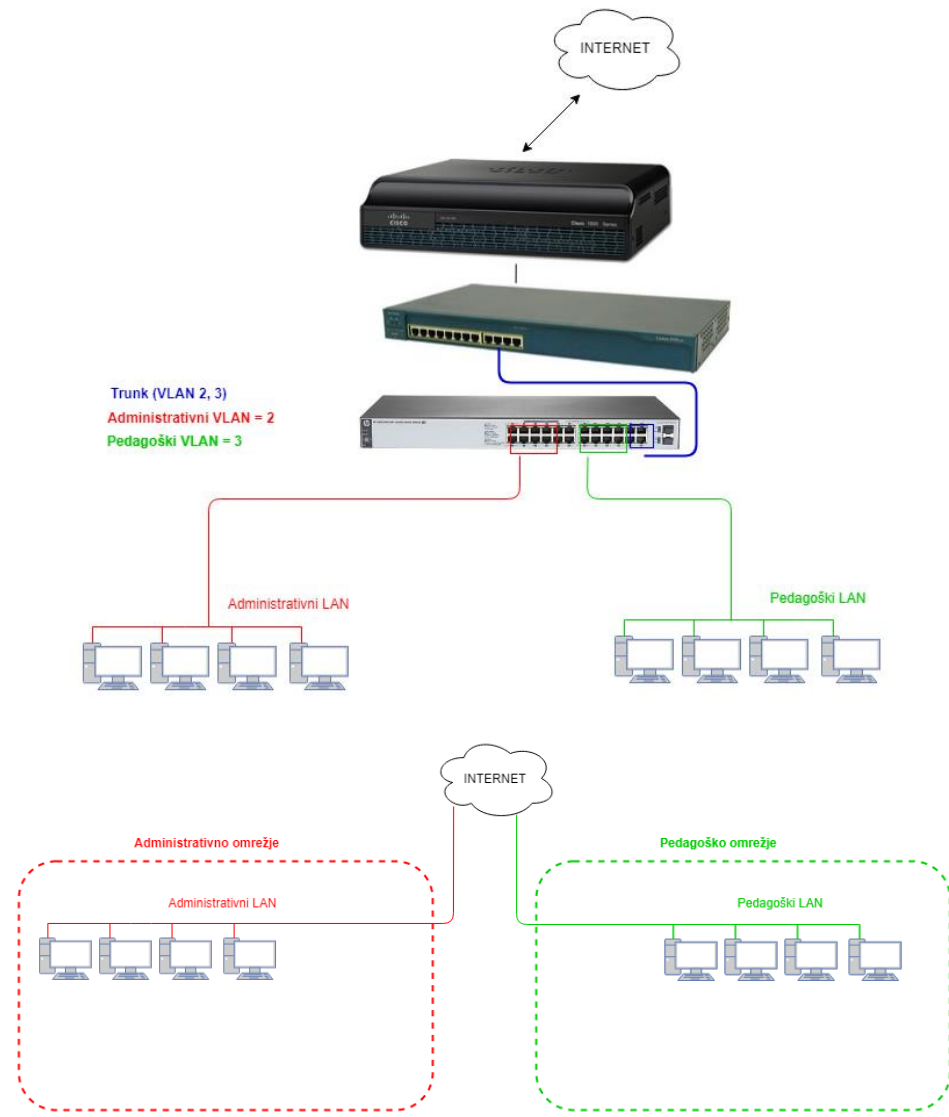


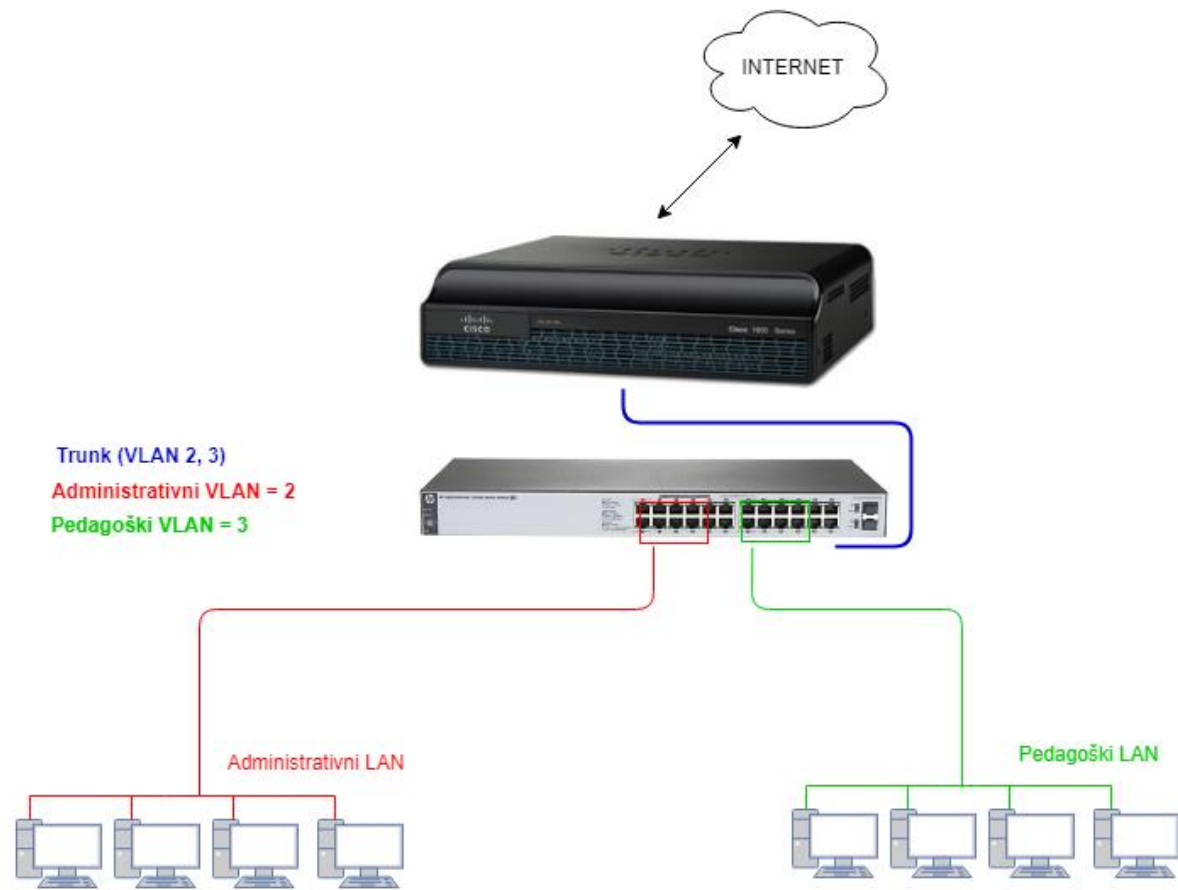


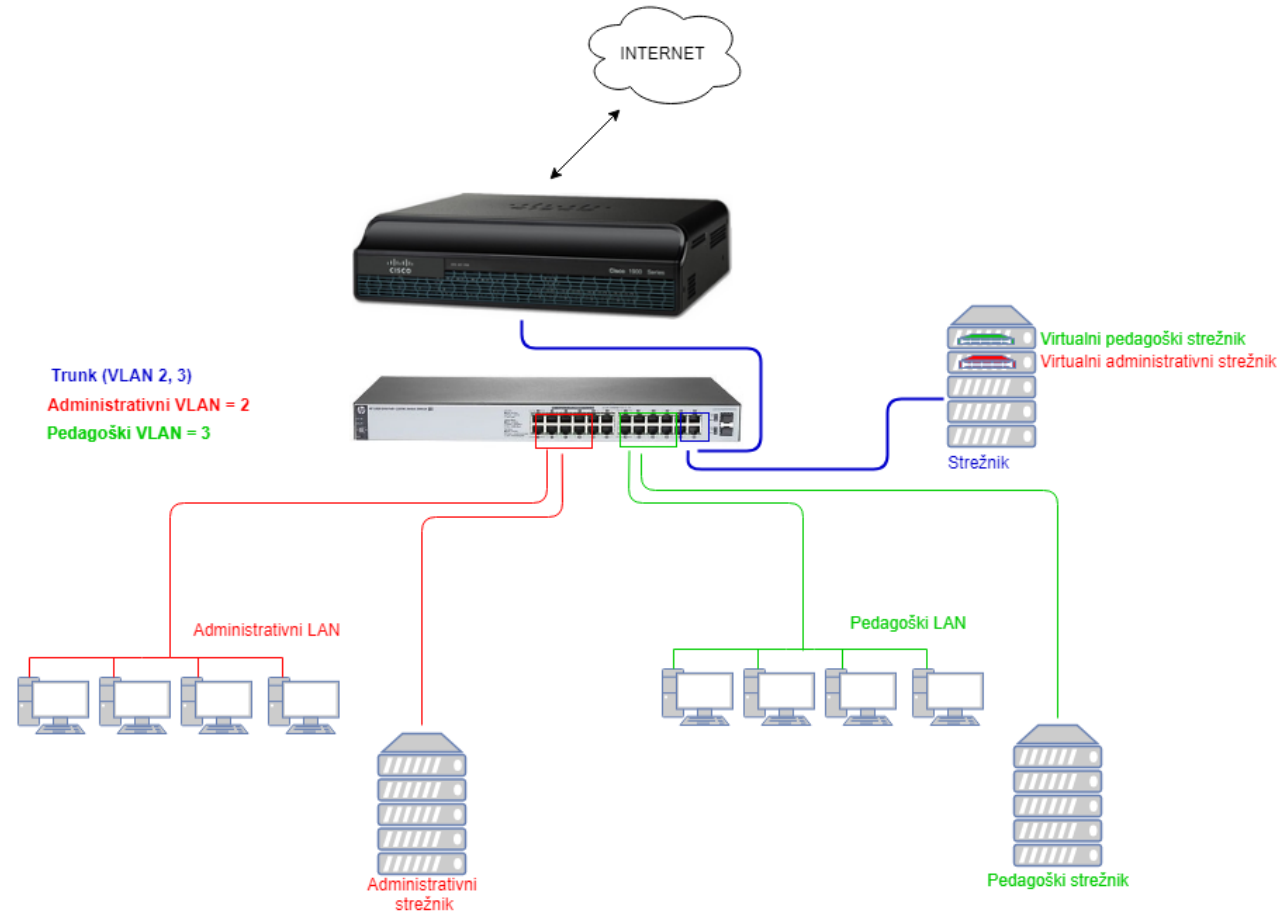


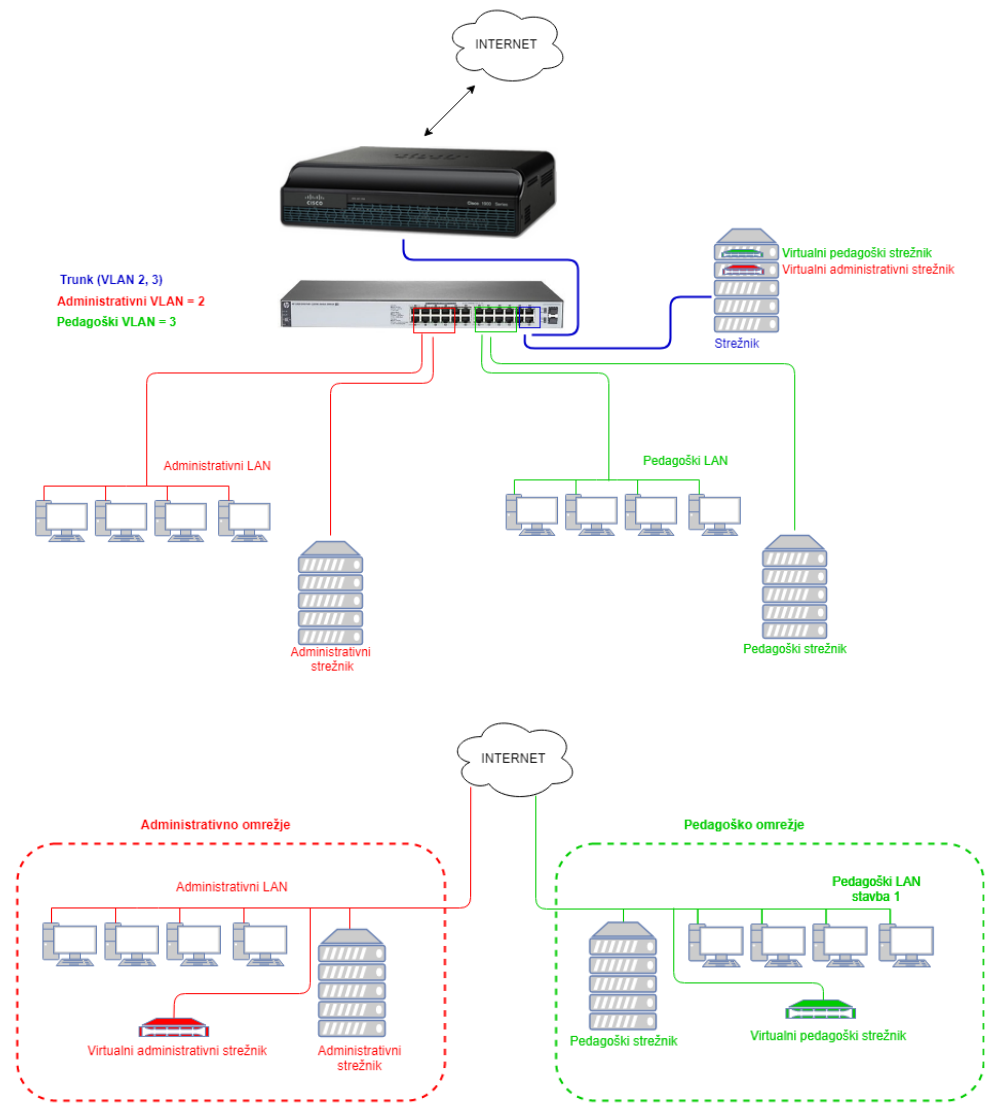


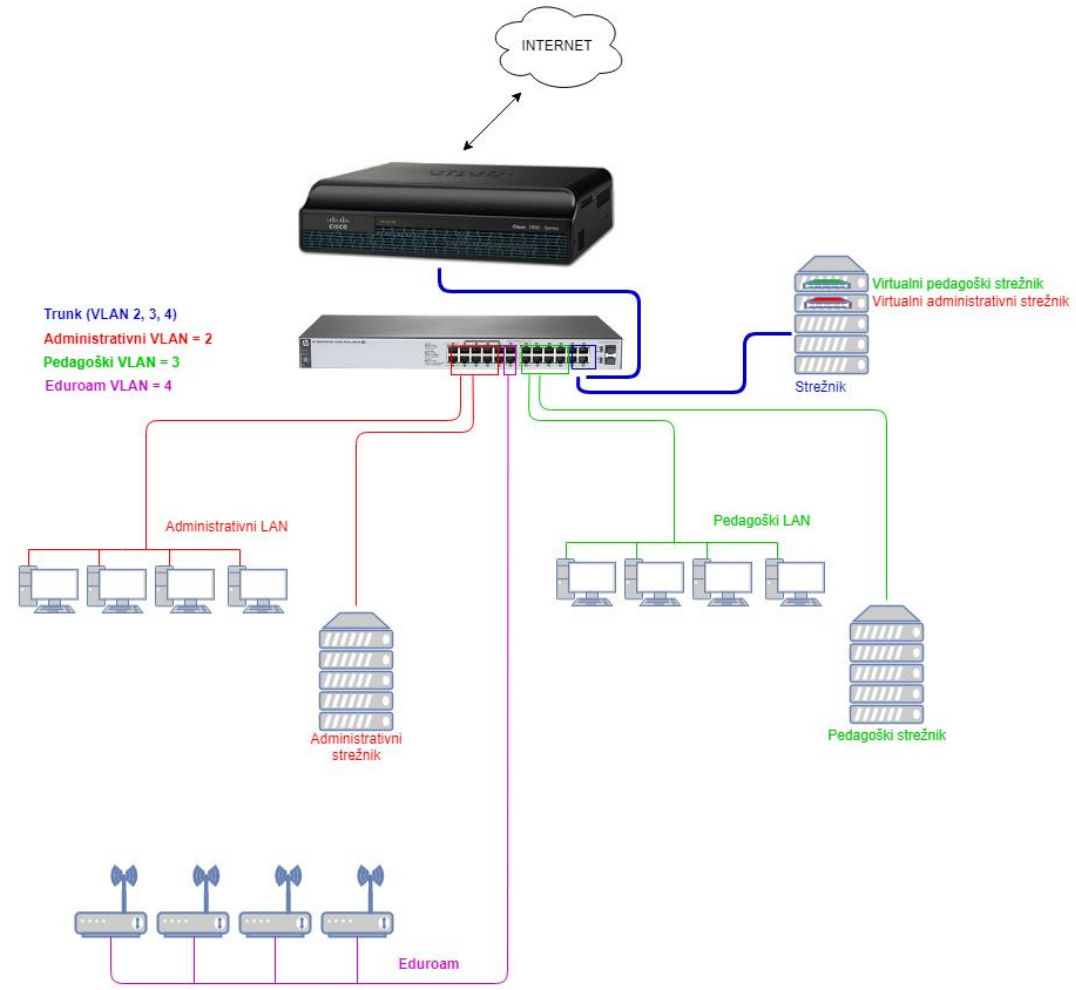


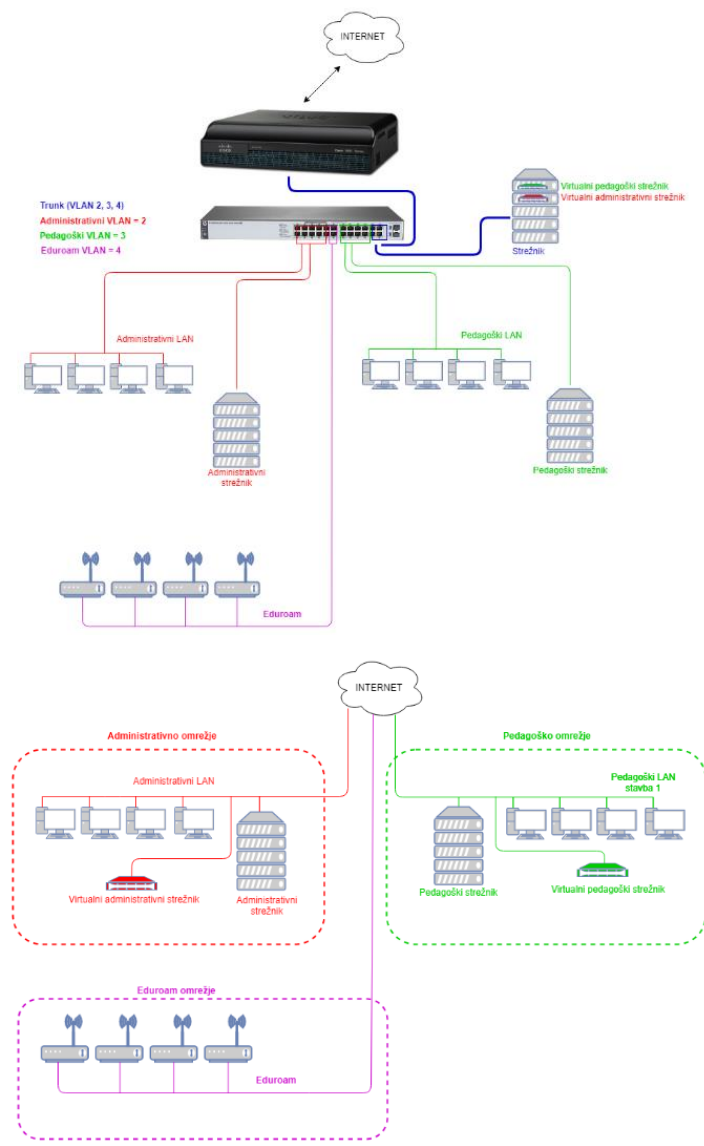


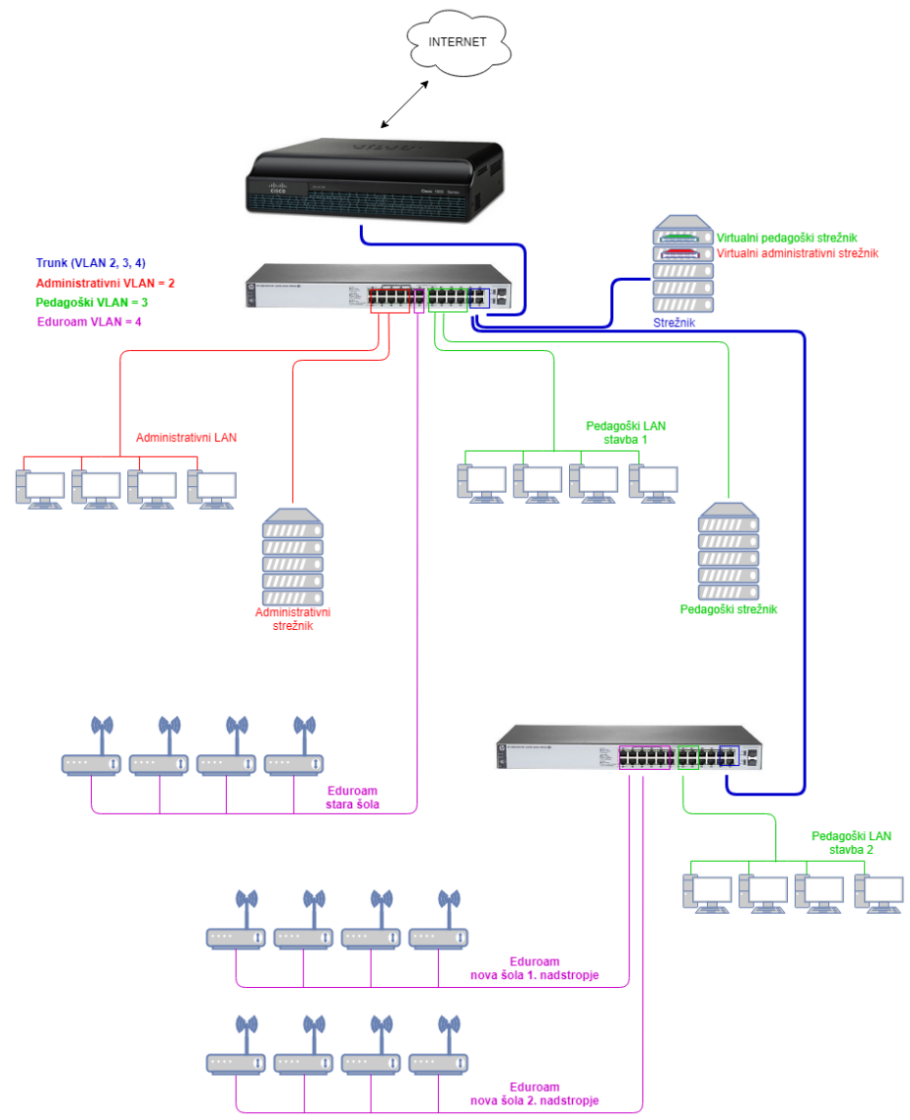


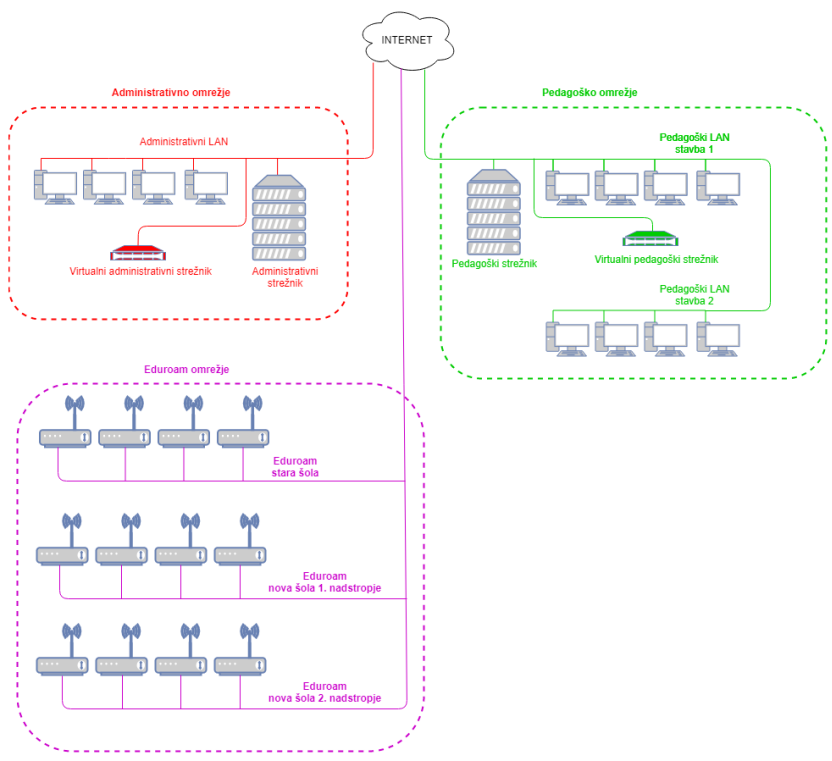
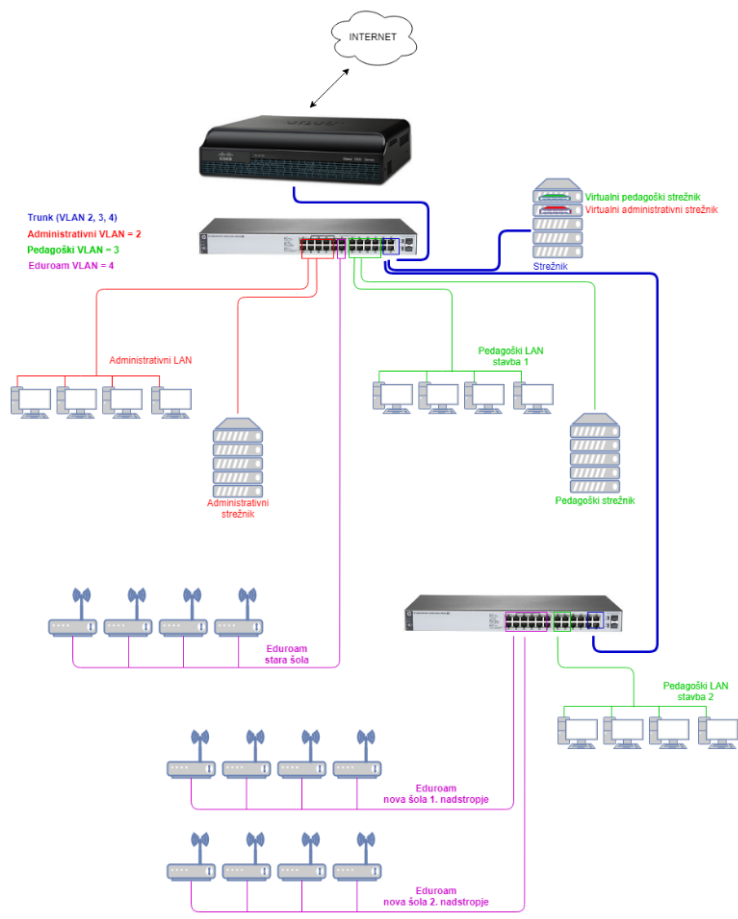














ZAKAJ UPORABITI VLAN-E?

- Na istem stikalu lahko uredimo več ločenih omrežij.
- Računalnike, ki niso fizično na istem stikalu lahko povežemo v isto omrežje.
- Manjše število portov potrebnih za povezave med stikali.
- Več Virtualnih LAN-ov (VLAN-ov) na enem fizičnem mediju (kablju).



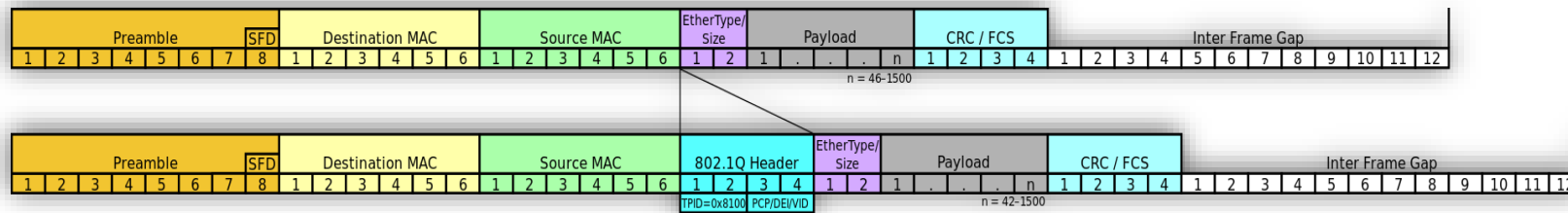
KAJ POTREBUJEMO ZA VLAN-E?

- Omrežje z nastavljenimi VLAN-i (ustrezno pripravljen usmerjevalnik).
- Pametno stikalo (ustrezno pripravljeno – nastavljen IP).
- Razumevanje uporabe in delovanja VLAN-ov.



MALO TEORIJE

- IEEE 802.1Q (Dot1q)
- V Ethernet paket se doda 32 bitov
- 12 bitov za oznako VLAN-a (možnih 4.094 različnih VLAN-ov; različna stikala različno max. število)
- Privzeti VLAN ID = 1



Vir: https://en.wikipedia.org/wiki/IEEE_802.1Q.



DEFINICIJA POJMOV

- VLAN ID
- Untagged
- Tagged
- Port type (access, hybrid, trunk)
- PVID (Pazljivo! Včasih se ne nastavi samodejno.)



KORAKI ZA NASTAVITEV VLAN-OV

1. Kreiranje VLAN ID.
2. Določanje pripadnosti portov.
3. Določanje tipa vmesnika (po potrebi).
4. Določanje PVID (po potrebi).



PRIMER NASTAVITEV VLAN-OV NA HP 1920

Web Management Platform

Network > VLAN

osfm-sw-01

Select VLAN Create Port Detail Detail Modify VLAN Modify Port Remove

VLAN range display. Select an option to view all available VLANs or a subset of configured VLANs.

Display all VLANs. Note: Displaying all VLANs may take some time.

Display a subset of all configured VLANs, example: 3,5-10.

Select

VLAN Summary

ID	Description	Untagged Membership	Tagged Membership
1	VLAN001	GE1/0/25-GE1/0/28	
2	Pedagoski	GE1/0/5-GE1/0/22	GE1/0/23-GE1/0/24
3	Administracija	GE1/0/1-GE1/0/4	GE1/0/11-GE1/0/12, GE1/0/23-GE1/0/24
4			GE1/0/11-GE1/0/12, GE1/0/23-GE1/0/24
5			GE1/0/11-GE1/0/12, GE1/0/23-GE1/0/24
6			GE1/0/11-GE1/0/12, GE1/0/23-GE1/0/24
100			GE1/0/11-GE1/0/12, GE1/0/23-GE1/0/24



PRIMER NASTAVITEV VLAN-OV NA HP 1920

The screenshot displays the HP Web Management Platform interface for configuring VLANs on a switch (osfm-sw-01). The left sidebar shows a navigation menu with 'VLAN' selected. The main content area has a top navigation bar with tabs: 'Select VLAN', 'Create', 'Port Detail', 'Detail', 'Modify VLAN', 'Modify Port', and 'Remove'. The 'Create' tab is active, showing a 'Create:' section with a 'VLAN IDs:' input field and a 'Create' button. Below this is a table of existing VLANs. The 'Modify VLAN description' section is also visible, with a 'Description' input field and an 'Apply' button. Red arrows highlight the 'Create' tab, the 'VLAN IDs' input field, and the 'Description' input field.

hp Web Management Platform

Network > VLAN

osfm-sw-01

Wizard

Stack

Summary

Device

Network

VLAN

VLAN Interface

Voice VLAN

MAC

MSTP

Link Aggregation

LACP

LLDP

ARP Management

ARP Anti-Attack

IGMP Snooping

MLD Snooping

IPv4 Routing

IPv6 Routing

DHCP

Service

Diagnostic Tools

Authentication

Security

QoS

Select VLAN Create Port Detail Detail Modify VLAN Modify Port Remove

Create:

VLAN IDs: Example:3, 5-10

ID	Description
1	VLAN001
2	Pedagoski
3	Administracija
4	
5	
6	
100	

Modify VLAN description (Note: you can do this later on the Modify VLAN page)

Modify the description of the selected VLAN:

ID	Description
<input type="text"/>	<input type="text"/> (1-32 Chars.) <input type="button" value="Apply"/>



PRIMER NASTAVITEV VLAN-OV NA HP 1920

hp Web Management Platform

Network > VLAN

osfm-sw-01

Select VLAN Create Port Detail Detail Modify VLAN Modify Port Remove

Please select a port:

HP 1920-24G Swi...

Port	Untagged Membership	Tagged Membership	Link Type	PVID
GE1/0/21	2		Access	2
GE1/0/23		2-6, 100	Hybrid	2
GE1/0/6	2		Access	2
GE1/0/8	2		Access	2
GE1/0/10	2		Access	2
GE1/0/12		3-6, 100	Hybrid	2
GE1/0/14	2		Access	2



PRIMER NASTAVITEV VLAN-OV NA HP 1920

The screenshot displays the HP Web Management Platform interface for configuring VLANs on an HP 1920-24G Switch. The left sidebar shows the navigation menu with 'VLAN' selected. The top navigation bar includes 'Select VLAN', 'Create', 'Port Detail', 'Detail', 'Modify VLAN', 'Modify Port', and 'Remove'. The 'Detail' tab is active, showing a dropdown menu for 'Please select a VLAN to display:' with '2 - Pedagoski' selected. Below this is a port configuration table for the switch. The table shows ports 1 through 24, with ports 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, and 23 highlighted in green, indicating they are tagged members of the selected VLAN. The table also shows ports 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, and 24, which are not highlighted. Below the table, there are two membership lists: 'Untagged Membership' and 'Tagged Membership'. The 'Untagged Membership' list shows 'GE1/0/5-GE1/0/22' and the 'Tagged Membership' list shows 'GE1/0/23-GE1/0/24'. Red arrows point to the 'Detail' tab, the VLAN selection dropdown, the port configuration table, and the membership lists.

Port	Membership
1	Tagged
2	Untagged
3	Tagged
4	Untagged
5	Tagged
6	Untagged
7	Tagged
8	Untagged
9	Tagged
10	Untagged
11	Tagged
12	Untagged
13	Tagged
14	Untagged
15	Tagged
16	Untagged
17	Tagged
18	Untagged
19	Tagged
20	Untagged
21	Tagged
22	Untagged
23	Tagged
24	Untagged



PRIMER NASTAVITEV VLAN-OV NA HP 1920

The screenshot displays the HP Web Management Platform interface for configuring a VLAN. The left sidebar shows a navigation menu with 'VLAN' selected. The main content area has a breadcrumb 'Network > VLAN' and a top navigation bar with tabs: 'Select VLAN', 'Create', 'Port Detail', 'Detail', 'Modify VLAN', 'Modify Port', and 'Remove'. The 'Modify Port' tab is active, indicated by a red arrow. Below the tabs, the 'Select Ports' section shows a grid of port numbers (1-28) for an 'HP 1920-24G Swi...'. Port 5 is highlighted with a red arrow, and a 'Select All' button is also indicated by a red arrow. Below the port grid, the 'Select membership type:' section has radio buttons for 'Untagged', 'Tagged', 'Not A Member', 'Link Type', and 'PVID'. The 'Untagged' option is selected, with a red arrow pointing to it. Below this, the 'Enter VLAN IDs to which the ports to be assigned:' section has a text input field for 'VLAN IDs' with an example '1,3,5-10'. A red arrow points to this input field. The 'Selected ports:' section shows a list of 'Untagged Membership' with 'GE1/0/5' listed. At the bottom right, there are 'Apply' and 'Cancel' buttons.



PRIMER NASTAVITEV VLAN-OV NA HP 1920

The screenshot displays the HP Web Management Platform interface for configuring a VLAN. The left sidebar shows a navigation menu with categories like Wizard, Stack, Summary, Device, Network, VLAN, VLAN Interface, Voice VLAN, MAC, MSTP, Link Aggregation, LACP, LLDP, ARP Management, ARP Anti-Attack, IGMP Snooping, MLD Snooping, IPv4 Routing, IPv6 Routing, DHCP, Service, Diagnostic Tools, Authentication, Security, and QoS. The main content area is titled "Web Management Platform" and "Network > VLAN". It features a breadcrumb trail: "Select VLAN" > "Create" > "Port Detail" > "Detail" > "Modify VLAN" > "Modify Port" > "Remove". The "Modify Port" tab is active, and a red arrow points to it. Below the breadcrumb, the "Select Ports" section shows a grid of 28 ports (1-28) for an "HP 1920-24G Swi...". A red arrow points to port 7, which is highlighted. Below the grid are "Select All" and "Select None" buttons. The "Select membership type:" section has radio buttons for "Untagged", "Tagged", "Not A Member", "Link Type" (selected), and "PVID". A red arrow points to the "Link Type" radio button. Below this, the "Link Type:" dropdown menu is open, showing "Access" (selected), "Hybrid", and "Trunk". A red arrow points to the "Access" option. The "Selected ports:" section shows a text box containing "GE1/0/7". At the bottom right, there are "Apply" and "Cancel" buttons.



PRIMER NASTAVITEV VLAN-OV NA HP 1810

HP 1810-249 Switch
18/24G
18/100/100GbBase-T Ports (1-24) - Ports are Auto-MDIX

Power: ■ ■ ■
Fault: ■ ■ ■
Locator: ■

Link/Act: No Link Full Activity No Link
Speed: 10 Mbps Full = 100 Mbps 10 = 1000 Mbps

Use only supported transceivers

Link/Act:
Spd:

Link/Act:
Spd:

Home
Setup Network
▶ Status
▶ Network Setup
▶ Switching
▶ Security
▶ Trunks
▼ VLANs
VLAN Configuration
VLAN Ports
Participation / Tagging
▶ LLDP
▶ Diagnostics
▶ Maintenance

VLANs ▶ VLAN Configuration

VLAN

Create VLAN

Create VLAN ID (2 - 4094)

Number of VLANs 10

VLAN ID	VLAN Name	Set Name	Delete VLAN
1	default	<input type="checkbox"/>	<input type="checkbox"/>
2	adminLAN	<input type="checkbox"/>	<input type="checkbox"/>
3	classroomsLAN	<input type="checkbox"/>	<input type="checkbox"/>
4		<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>
98		<input type="checkbox"/>	<input type="checkbox"/>
99		<input type="checkbox"/>	<input type="checkbox"/>
100		<input type="checkbox"/>	<input type="checkbox"/>
893		<input type="checkbox"/>	<input type="checkbox"/>
894		<input type="checkbox"/>	<input type="checkbox"/>

Apply



PRIMER NASTAVITEV VLAN-OV NA HP 1810

HP 1810-24G Switch
12651A

12/100/1000Base-T Ports (1-24) - Ports are Auto-MDIX

Link/Act: Off = No Link, Flas = Activity, On = Link

*Speed: Off = 10 Mbps, Flas = 100 Mbps, On = 1000 Mbps

Refresh

Home
Setup Network
Status
Network Setup
Switching
Security
Trunks
VLANs
VLAN Configuration
VLAN Ports
Participation / Tagging
LLDP
Diagnostics
Maintenance

VLANs ▶ Participation / Tagging

VLAN Tagging

VLAN: 2

U Tag / Exclude All

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
	E	T	E	U	U	E	U	U	U	U	U	U	U	T	U	T	U	U	U	U	U	E	T	T	T	

Apply



PRIMER NASTAVITEV VLAN-OV NA CISCO SF-300

Small Business
cisco SF300-24 24-Port 10/100 Managed Switch

Language: English Logout About Help

Getting Started
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VLAN Management
Default VLAN Settings
VLAN Settings
Interface Settings
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Port VLAN Membership
Private VLAN Settings
GVRP Settings
VLAN Groups
Voice VLAN
Access Port Multicast TV VLAN
Customer Port Multicast TV VLAN
Spanning Tree
MAC Address Tables
Multicast
IP Configuration
Security
Access Control
Quality of Service
SNMP

VLAN Settings

<input type="checkbox"/>	VLAN ID	VLAN Name	Originators	VLAN Interface State	Link Status	SNMP Traps
<input type="checkbox"/>	1		Default	Enabled	Enabled	
<input type="checkbox"/>	2	Pedagoski	Static	Enabled	Enabled	
<input type="checkbox"/>	3	administrativni	Static	Enabled	Enabled	
<input type="checkbox"/>	4		Static	Enabled	Enabled	
<input type="checkbox"/>	5		Static	Enabled	Enabled	
<input type="checkbox"/>	6		Static	Enabled	Enabled	
<input type="checkbox"/>	100		Static	Enabled	Enabled	

Add... Edit... Delete



PRIMER NASTAVITEV VLAN-OV NA CISCO SF-300

Small Business
cisco SF300-24 24-Port 10/100 Managed Switch

Language: English | Logout | About | Help

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Interface Settings

Showing 1-28 of 28 All per page

Filter: Interface Type equals to Port Go

Entry No.	Interface	Interface VLAN Mode	Administrative PVID	Frame Type	Ingress Filtering	Primary VLAN	Secondary VLANs
<input type="radio"/>	1 FE1	Access	2	Admit All	Enabled		
<input type="radio"/>	2 FE2	Access	2	Admit All	Enabled		
<input type="radio"/>	3 FE3	Access	2	Admit All	Enabled		
<input type="radio"/>	4 FE4	Access	2	Admit All	Enabled		
<input type="radio"/>	5 FE5	Access	2	Admit All	Enabled		
<input type="radio"/>	6 FE6	Access	2	Admit All	Enabled		
<input type="radio"/>	7 FE7	Access	2	Admit All	Enabled		
<input type="radio"/>	8 FE8	Access	2	Admit All	Enabled		
<input type="radio"/>	9 FE9	Access	2	Admit All	Enabled		
<input type="radio"/>	10 FE10	Access	2	Admit All	Enabled		
<input type="radio"/>	11 FE11	Access	2	Admit All	Enabled		
<input type="radio"/>	12 FE12	Access	2	Admit All	Enabled		
<input type="radio"/>	13 FE13	Access	2	Admit All	Enabled		
<input type="radio"/>	14 FE14	Access	2	Admit All	Enabled		
<input type="radio"/>	15 FE15	Access	2	Admit All	Enabled		
<input type="radio"/>	16 FE16	Access	2	Admit All	Enabled		
<input type="radio"/>	17 FE17	Trunk	2	Admit All	Enabled		
<input type="radio"/>	18 FE18	Trunk	2	Admit All	Enabled		
<input type="radio"/>	19 FE19	Trunk	2	Admit All	Enabled		
<input type="radio"/>	20 FE20	Trunk	2	Admit All	Enabled		
<input type="radio"/>	21 FE21	Trunk	2	Admit All	Enabled		
<input type="radio"/>	22 FE22	Trunk	2	Admit All	Enabled		
<input type="radio"/>	23 FE23	Trunk	2	Admit All	Enabled		
<input type="radio"/>	24 FE24	Trunk	2	Admit All	Enabled		
<input type="radio"/>	25 GE1	Trunk	2	Admit All	Enabled		
<input type="radio"/>	26 GE2	Trunk	2	Admit All	Enabled		
<input type="radio"/>	27 GE3	General	2	Admit All	Enabled		
<input type="radio"/>	28 GE4	Trunk	1	Admit All	Enabled		

Copy Settings... Edit...

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PRIMER NASTAVITEV VLAN-OV NA CISCO SF-300

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Language: English Logout About Help

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Port to VLAN

VLAN Membership Table Showing 1-28 of 28 All per page

Filter: VLAN ID equals to 4
AND Interface Type equals to

Interface Name	VLAN Mode	Membership Type	PVID
FE1	Access	Excluded	
FE2	Access	Excluded	
FE3	Access	Excluded	
FE4	Access	Excluded	
FE5	Access	Excluded	
FE6	Access	Excluded	
FE7	Access	Excluded	
FE8	Access	Excluded	
FE9	Access	Excluded	
FE10	Access	Excluded	
FE11	Access	Excluded	
FE12	Access	Excluded	
FE13	Access	Excluded	
FE14	Access	Excluded	
FE15	Access	Excluded	
FE16	Access	Excluded	
FE17	Trunk	Tagged	
FE18	Trunk	Tagged	
FE19	Trunk	Tagged	
FE20	Trunk	Tagged	
FE21	Trunk	Tagged	
FE22	Trunk	Tagged	
FE23	Trunk	Tagged	
FE24	Trunk	Tagged	
GE1	Trunk	Tagged	
GE2	Trunk	Tagged	
GE3	General	Excluded	
GE4	Trunk	Tagged	

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PRIMER NASTAVITEV VLAN-OV NA CISCO SF-300

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SF300-24 24-Port 10/100 Managed Switch

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Customer Port Multicast TV VLAN
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Port VLAN Membership

F - Forbidden member T - Tagged member U - Untagged member I - Internally used VLAN P - PVID G - Guest VLAN M - Multicast TV VLAN Pp - Private VLAN Primary Ps - Private VLAN Secondary

Port VLAN Membership Table

Showing 1-28 of 28 All per page

Filter: Interface Type equals to Port Go

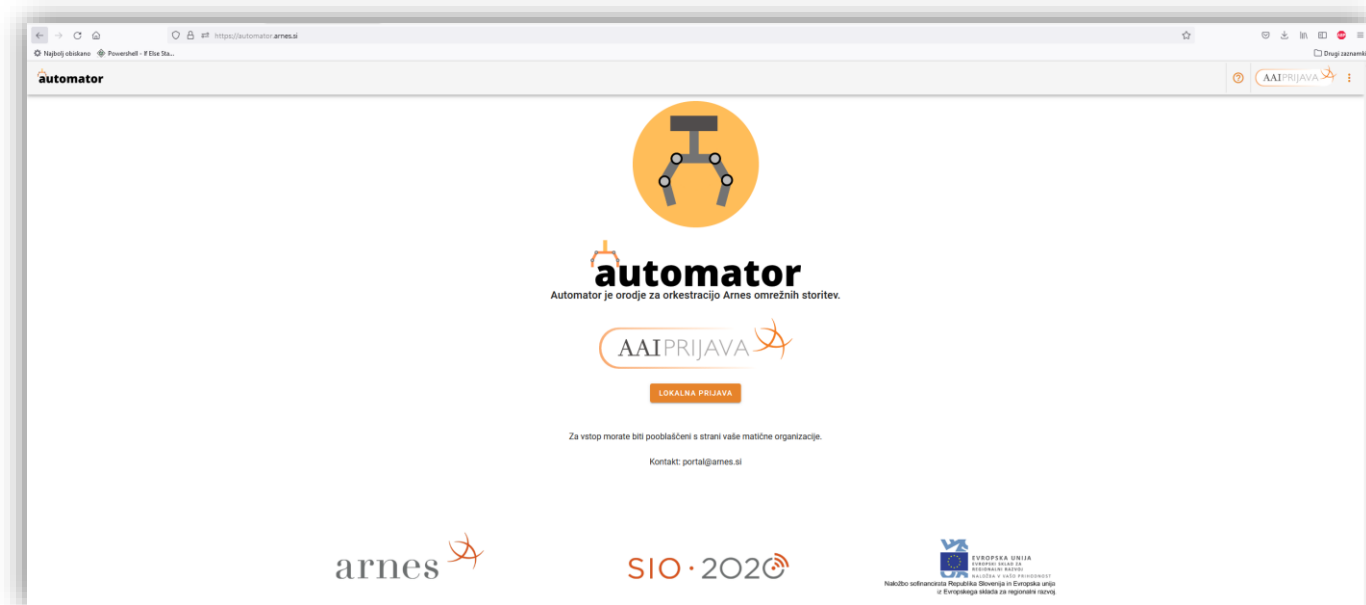
Interface	Mode	Administrative VLANs	Operational VLANs	LAG
<input type="radio"/> FE1	Access	2UP	2UP	
<input type="radio"/> FE2	Access	2UP	2UP	
<input type="radio"/> FE3	Access	2UP	2UP	
<input type="radio"/> FE4	Access	2UP	2UP	
<input type="radio"/> FE5	Access	2UP	2UP	
<input type="radio"/> FE6	Access	2UP	2UP	
<input type="radio"/> FE7	Access	2UP	2UP	
<input type="radio"/> FE8	Access	2UP	2UP	
<input type="radio"/> FE9	Access	2UP	2UP	
<input type="radio"/> FE10	Access	2UP	2UP	
<input type="radio"/> FE11	Access	2UP	2UP	
<input type="radio"/> FE12	Access	2UP	2UP	
<input type="radio"/> FE13	Access	2UP	2UP	
<input type="radio"/> FE14	Access	2UP	2UP	
<input type="radio"/> FE15	Access	2UP	2UP	
<input type="radio"/> FE16	Access	2UP	2UP	
<input type="radio"/> FE17	Trunk	2UP, 3T, 4T, 5T, 6T, 100T	2UP, 3T, 4T, 5T, 6T, 100T	
<input type="radio"/> FE18	Trunk	2UP, 3T, 4T, 5T, 6T, 100T	2UP, 3T, 4T, 5T, 6T, 100T	
<input type="radio"/> FE19	Trunk	2UP, 3T, 4T, 5T, 6T, 100T	2UP, 3T, 4T, 5T, 6T, 100T	
<input type="radio"/> FE20	Trunk	2UP, 3T, 4T, 5T, 6T, 100T	2UP, 3T, 4T, 5T, 6T, 100T	
<input type="radio"/> FE21	Trunk	2UP, 3T, 4T, 5T, 6T, 100T	2UP, 3T, 4T, 5T, 6T, 100T	
<input type="radio"/> FE22	Trunk	2UP, 3T, 4T, 5T, 6T, 100T	2UP, 3T, 4T, 5T, 6T, 100T	
<input type="radio"/> FE23	Trunk	2UP, 3T, 4T, 5T, 6T, 100T	2UP, 3T, 4T, 5T, 6T, 100T	
<input type="radio"/> FE24	Trunk	2UP, 3T, 4T, 5T, 6T, 100T	2UP, 3T, 4T, 5T, 6T, 100T	
<input type="radio"/> GE1	Trunk	2UP, 3T, 4T, 5T, 6T, 100T	2UP, 3T, 4T, 5T, 6T, 100T	
<input type="radio"/> GE2	Trunk	2UP, 3T, 4T, 5T, 6T, 100T	2UP, 3T, 4T, 5T, 6T, 100T	
<input type="radio"/> GE3	General	2UP, 5T, 100T	2UP, 5T, 100T	
<input type="radio"/> GE4	Trunk	1UP, 2T, 3T, 4T, 5T, 6T, 100T	1UP, 2T, 3T, 4T, 5T, 6T, 100T	

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ARNES AUTOMATOR

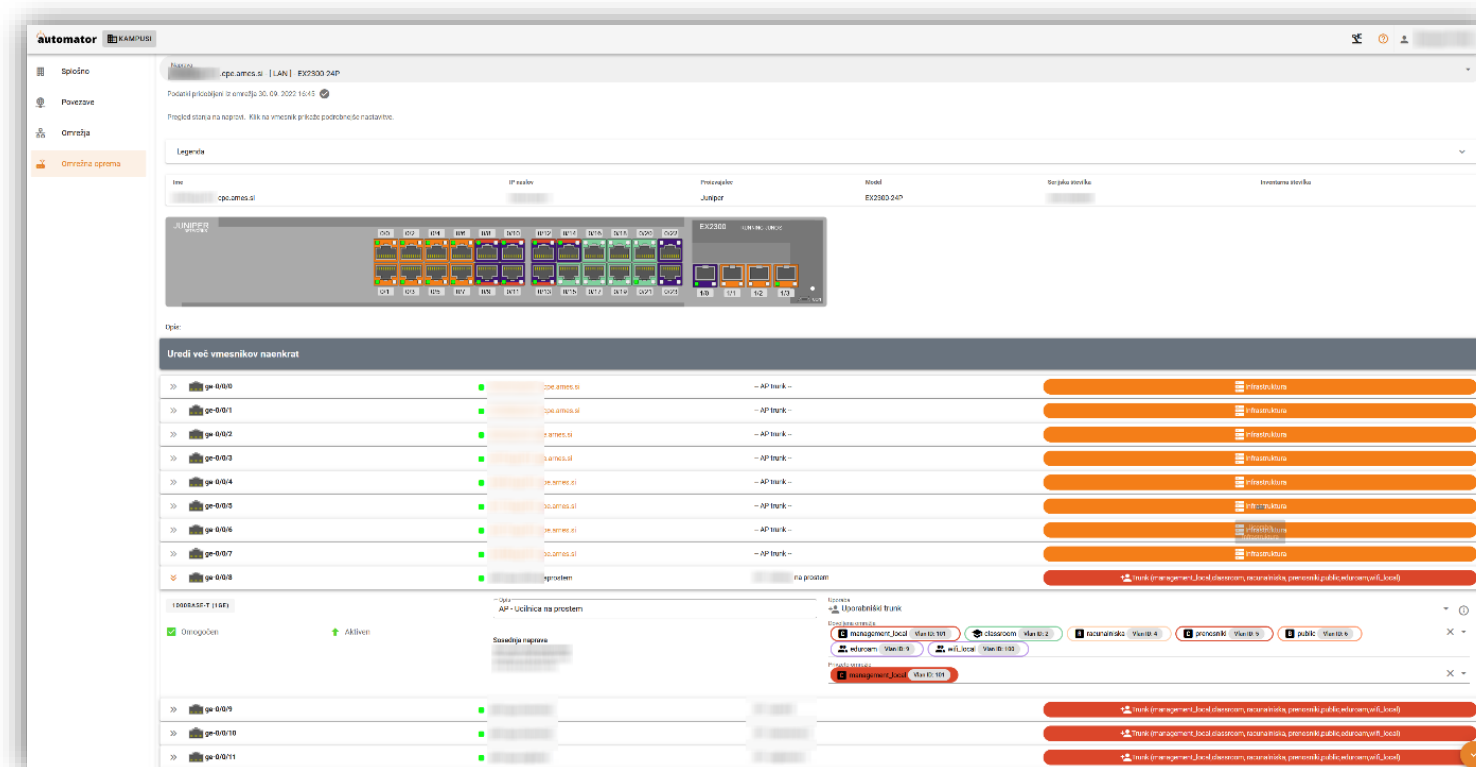
1. <https://automator.arnes.si/>
2. Omogoča upravljanje stikal, ki so bila šolam dobavljena v okviru projekta SIO 2020.





ARNES AUTOMATOR

Podrobnejša video navodila za uporabo se nahajajo v tej spletni učilnici v poglavju **Arnes orodja**.





VIRI

- https://en.wikipedia.org/wiki/Virtual_LAN
- https://en.wikipedia.org/wiki/IEEE_802.1Q
- <https://wiki.mikrotik.com/wiki/Manual:Interface/VLAN>
- Uporabniška navodila za opremo: HPE, Cisco