

Rețele de Calculatoare

Rețele Wireless - WiFi

Sumarul laboratorului

1

Rețele Wireless

Rețele Mobile
Bluetooth
IRDA
WiFi

2

Analizoare WiFi

Acrylic WiFi Home
Analizoare Linux

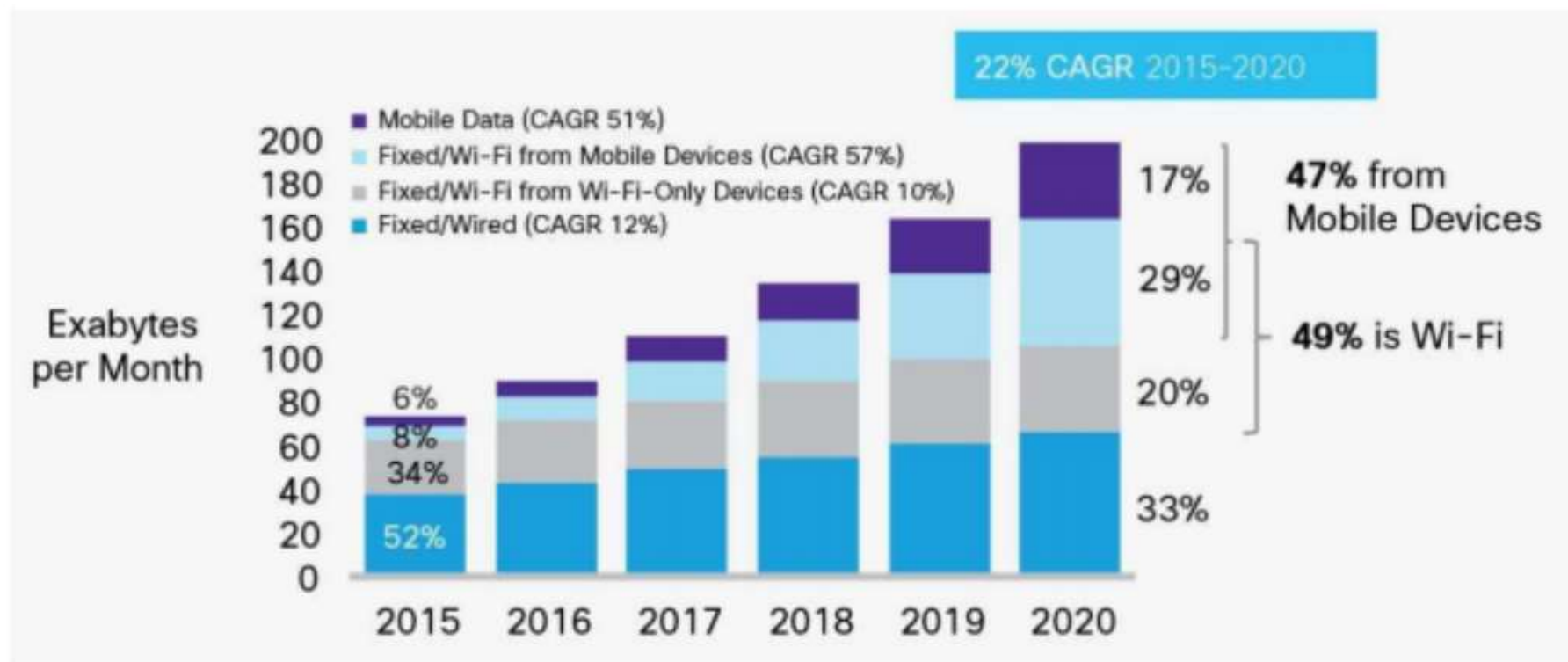
3

Cum configurăm un ruter WiFi



Rețele Wireless

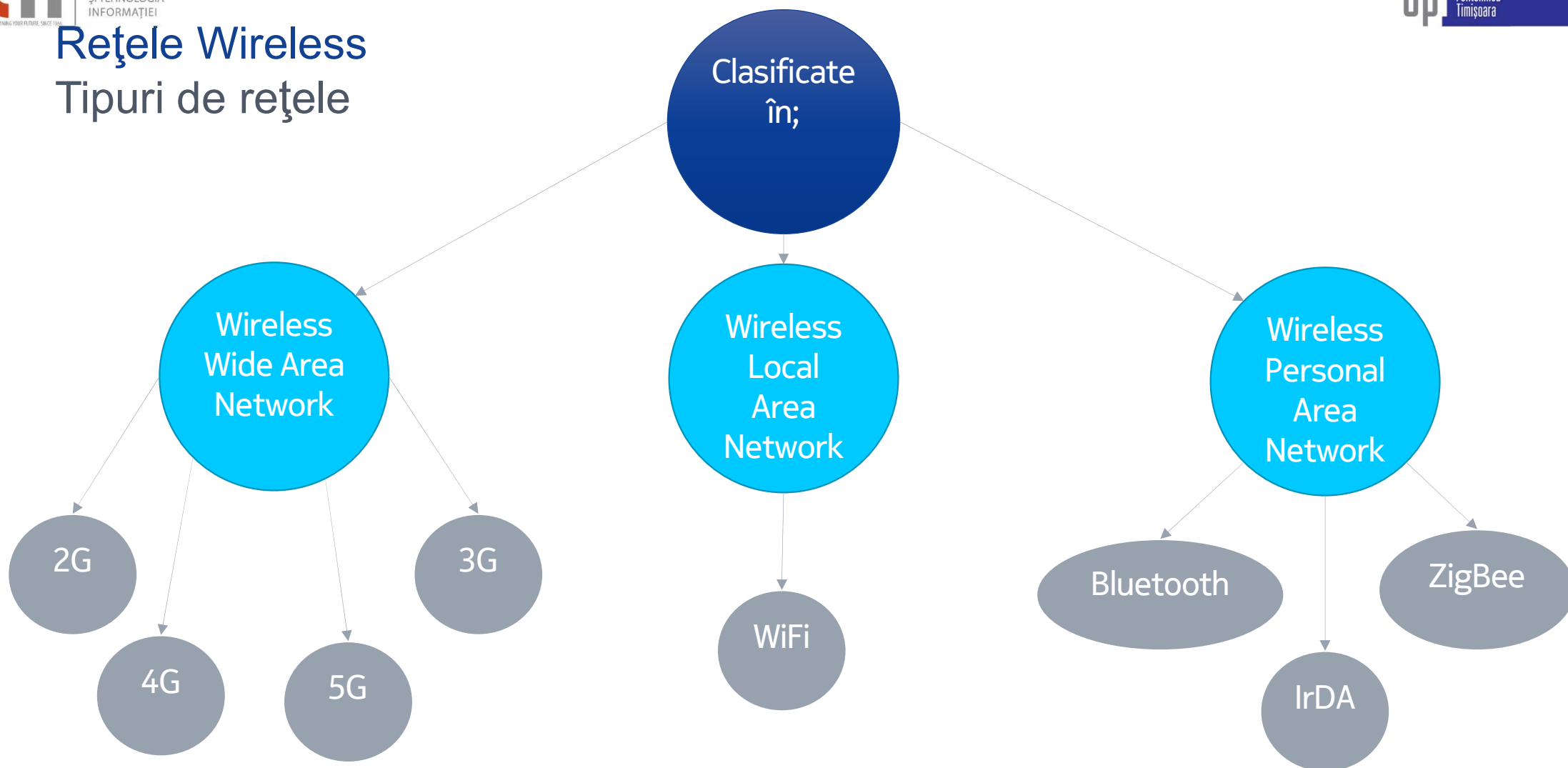
De ce le discutăm separat?



*Figure 1: IP Traffic By Access Technology
Cisco Visual Networking Index*

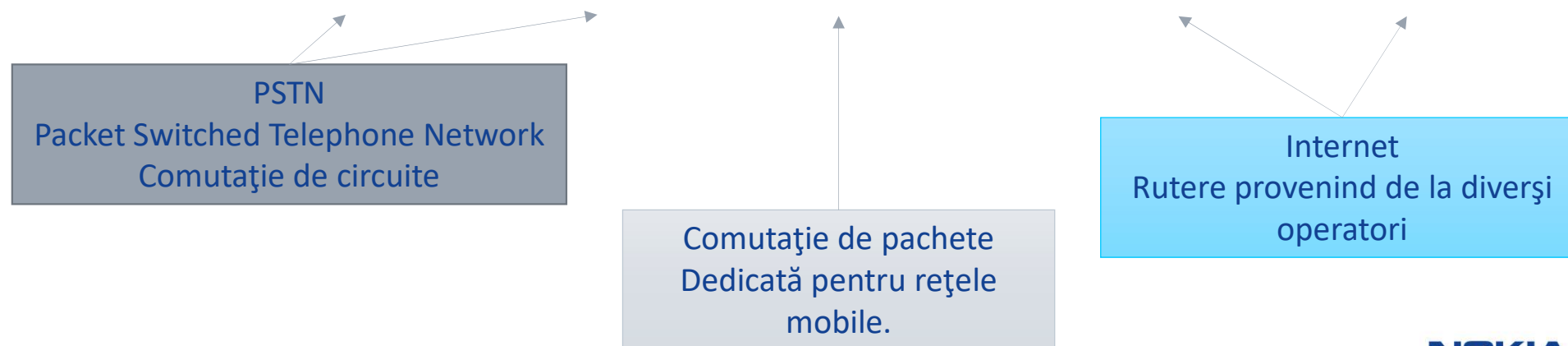
Rețele Wireless

Tipuri de rețele



Scurtă comparație între generațiile mobile

Specificații	1G	2G	3G	4G	5G
An de lansare	1970/1984	1980/1999	1990/2002	2000/2010	2010->
Tehnologie de bază	---	GSM	WCDMA	LTE/WiMAX	MIMO/mmWaves
Frecvența	30KHz	1.8GHz	1.6-2GHz	2-8GHz	3-30GHz
Debit	2kbps	14.4-64kbps	2Mbps	200Mbps-1Gbps	1Gbps an up
Rețeaua de core	PTSN	PTSN	Switching de pachete	Internet	Internet



Categorii

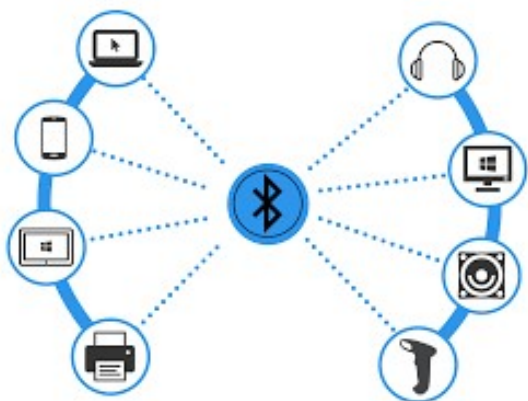
Bluetooth

Caracteristici

Debit: 768kbps (v1) ->
24Mbps (Bt Smart)

Distanța: 10 – 100m

Frecvența: 2,4GHz



Probleme:
Interferență de canal

IrDA

Caracteristici

Debit: 9.6kbps (SIR) ->
1Gbps (GigaIR)

Distanța: 2m

Unghi maxim: 15°



Probleme: Întreruperea Line of
sight (LoS)



Versiunea	Debit maxim [Mbps]	Frecvența [GHz]	Backwards compatibility
802.11a	54	5	Nu
802.11b	11	2.4	Nu
802.11g	54	2.4	802.11b
802.11n	600	2.4 & 5	802.11b/g
802.11ac	1300	2.4 & 5	802.11b/g/n
802.11ad	7000	2.4 , 5 & 60	802.11b/g/n/ac



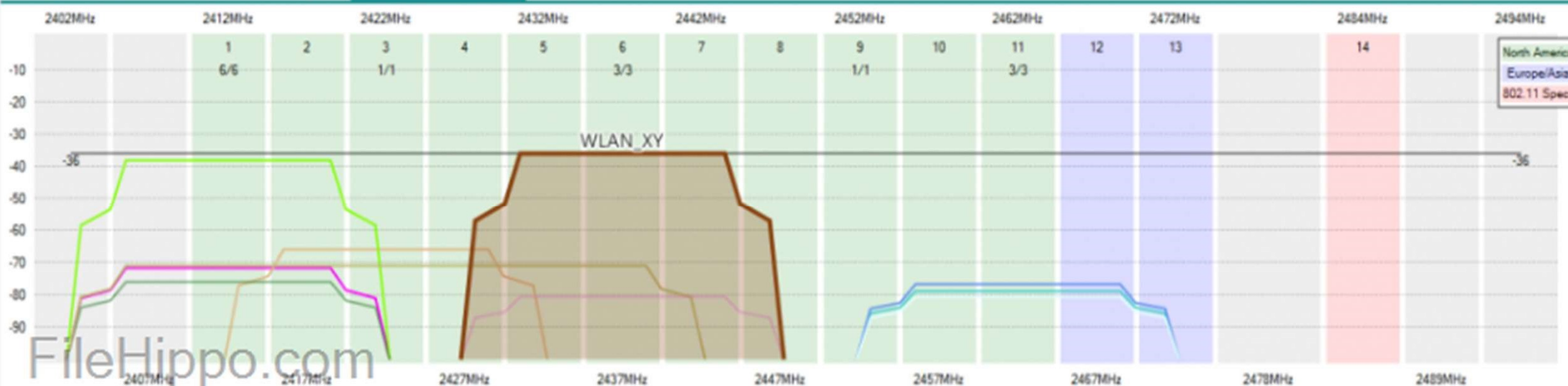
SSID	MAC Address	RSSI	Chan	802.11	Max Speed	WEP	WPA	WPA2	WPS	Vendor	First	Last	Type
WLAN_XY	60:A4:4C:69:D2:48	-36	6	b, g, n	216.7 Mbps			MGT-CCMP		ASUSTek COMPUTER IN	18:57:14	now	Infrastructure
5b4d2d	AP 5b4d2d	-79	11	b, g, n	144.4 Mbps		PSK-(TKIP)CCMP	PSK-(TKIP)CCMP	1.0	PEGATRON CORPORATI	18:57:14	now	Infrastructure
famalsu	E2:41:36:0C:4C:A0	-77	11	b, g, n	144.4 Mbps			PSK-CCMP			18:57:14	now	Infrastructure
WebSTAR	AP WebSTAR	-72	1	b, g	54 Mbps SharedKey					ASUSTek COMPUTER IN	18:57:14	now	Infrastructure
SERGIO	AP SERGIO	-66	3	b, g, n	130 Mbps		PSK-(TKIP)CCMP	PSK-(TKIP)CCMP	1.0	Hitron Technologies, Inc	18:57:14	now	Infrastructure
HACKERS AHEAD	00:1E:8E:6B:A5:B3	-38	1	b, g	54 Mbps			PSK-CCMP		Cisco-Linksys, LLC	18:57:14	now	Infrastructure
RodMos	00:26:24:CD:D4:D4	-76	1	b, g	54 Mbps		PSK-(TKIP)CCMP	PSK-(TKIP)CCMP		Thomson Inc.	18:57:12	00:00:10 ago	Infrastructure
WIRE6969	E8:DE:27:C0:61:8E	-71	1+5	b, g, n	300 Mbps		PSK-(TKIP)CCMP	PSK-(TKIP)CCMP	1.0	TP-LINK TECHNOLOGIE	18:57:14	now	Infrastructure
wifidentesR	02:71:C2:14:7D:CF	-81	11	b, g, n	144.4 Mbps		MGT-(TKIP)CCMP	MGT-(TKIP)CCMP			18:57:12	now	Infrastructure
BURLINGTON	F8:63:94:9A:16:B3	-81	6	b, g, n	144.4 Mbps		PSK-(TKIP)CCMP				18:57:40	00:00:10 ago	Infrastructure
CBS-27BA	14:B9:68:FD:27:C0	-83	1	b, g, n	270 Mbps		PSK-(TKIP)CCMP		1.0	HUAWEI TECHNOLOGIE	18:58:01	00:00:39 ago	Infrastructure
iPhone de Javier	2A:70:46:D4:61:EF	-81	1	b, g	54 Mbps			PSK-CCMP			19:00:04	00:16:58 ago	Infrastructure
JAZZTEL_uhvf	54:22:F8:E4:85:70	-83	9	b, g, n	130 Mbps		PSK-CCMP	PSK-CCMP		zte corporation	19:01:33	00:15:30 ago	Infrastructure
wVF695	96:D8:69:10:EC:A2	-80	6	b, g, n	72.2 Mbps		PSK-(TKIP)CCMP				19:11:11	00:01:44 ago	Infrastructure

Signal Strength

Network Quality

2.4GHz APs Channels

5GHz APs Channels



Analiză WiFi

Acrylic WiFi Home

SSID	MAC Address	RSSI	Chan	Max Speed	WEP	WPA	WPA2	WPS	Vendor
UPC Wi-Free	AE:22:05:C2:4F:36	-21	36+40+44+48	1300.05 Mbps			MGT-CCMP		Compal Broadband Networks. Ir
Orange-HrN6	40:EE:DD:67:54:D8	-79	1+5	300 Mbps			PSK-CCMP		HUAWEI TECHNOLOGIES CO.LT
UPC Wi-Free	46:32:C8:9D:72:F1	-79	11	144.4 Mbps			MGT-(TKIP CCMP)		Technicolor CH USA Inc.
FBI Surveillance	54:67:51:41:99:F5	-79	36+40+44+48	1300.05 Mbps		PSK-TKIP	PSK-CCMP	1.0	Compal Broadband Networks. Ir
UPC Wi-Free	3A:43:1D:8C:57:31	-82	6	300 Mbps			MGT-(TKIP CCMP)		
HUAWEI-Q6Gy	90:17:AC:72:17:5C	-83	7	144.4 Mbps		PSK-(TKIP CCMP)	PSK-(TKIP CCMP)		HUAWEI TECHNOLOGIES CO.LT
UPCEED7277	AC:22:05:C2:50:35	-10	36+40+44+48	1300.05 Mbps		PSK-TKIP	PSK-CCMP	1.0	Compal Broadband Networks. Ir
UPC Wi-Free	AE:22:15:C2:50:42	-17	11	144.4 Mbps			MGT-(TKIP CCMP)		
UPCEED7277	AC:22:05:C2:50:42	-16	11	144.4 Mbps		PSK-(TKIP CCMP)	PSK-(TKIP CCMP)	1.0	Compal Broadband Networks. Ir
FBI Surveillance	54:67:51:41:99:C5	-76	1	144.4 Mbps		PSK-(TKIP CCMP)	PSK-(TKIP CCMP)	1.0	Compal Broadband Networks. Ir
UPC Wi-Free	56:67:11:A1:90:BC	-83	1	300 Mbps			MGT-(TKIP CCMP)		
Tenda	58:D9:D5:7F:25:91	-54	1	144.4 Mbps		PSK-CCMP	PSK-CCMP		Tenda Technology Co.Ltd.Dongg
Orange-hD4P-2.4G	28:41:C6:B5:7D:C8	-68	11	144.4 Mbps			PSK-CCMP		HUAWEI TECHNOLOGIES CO.LT
Orange-hD4P-5G	28:41:C6:B5:7D:CC	-79	36+40+44+48	1300.05 Mbps			PSK-CCMP	1.0	HUAWEI TECHNOLOGIES CO.LT

Parametri disponibili

- SSID pentru fiecare rețea
- Puterea semnalului in dB
- Numărul canalului și frecvența centrală
- Setările de securitate
- Versiunea 802.11
- Diverse grafice

Pentru Android & IOS
verificați store-ul

Windows:
Acrylic WiFi home,
PRTG network monitor

NOKIA

Analizoare WiFi

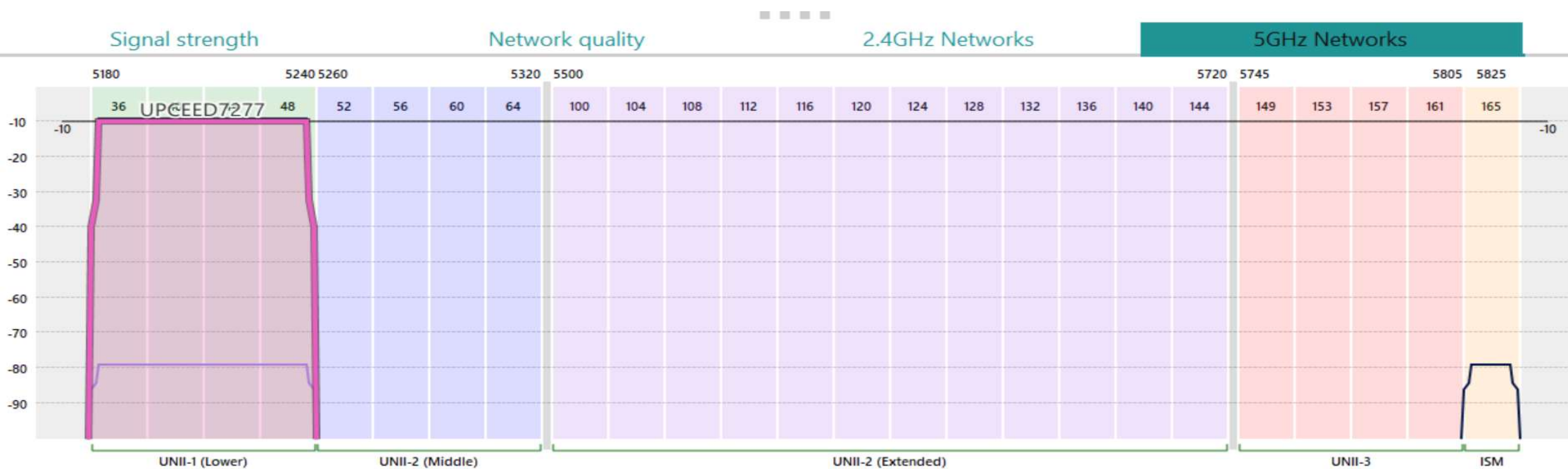
Acrylic WiFi Home



- Parametri
- Canalele de comunicații 1-14
 - Frecvența centrală a fiecărui canal
 - Nivelul de putere al fiecărui canal

Analizoare WiFi

Acrylic WiFi Home

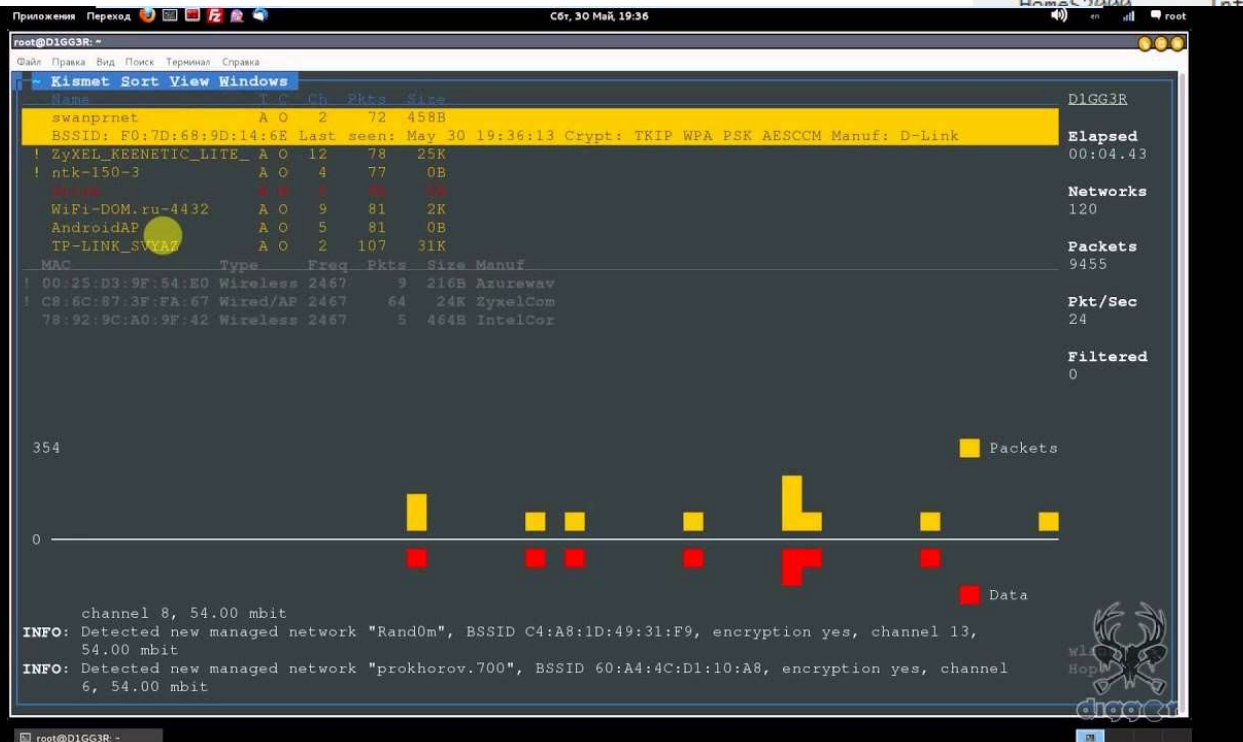


Network manager command line interface nmcli

```
nmcli d wifi
```

This is an output of command:

* SSID	MODE	CHAN	RATE	SIGNAL	BARS	SECURITY
151022	Infra	4	54 Mbit/s	74	<div><div></div><div></div><div></div><div></div><div></div></div>	
mary	Infra	4	54 Mbit/s	74	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA2
151022	Infra	40	54 Mbit/s	70	<div><div></div><div></div><div></div><div></div><div></div></div>	
mary5	Infra	40	54 Mbit/s	60	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA2
Don Ceci	Infra	6	54 Mbit/s	34	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA1 WPA2
epg72	Infra	11	54 Mbit/s	34	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA1 WPA2
Mitio Paynera	Infra	2	54 Mbit/s	24	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA1 WPA2
Nina	Infra	1	54 Mbit/s	17	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA1 WPA2
Filka	Infra	10	54 Mbit/s	17	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA1
Mihaylov	Infra	11	54 Mbit/s	14	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA1 WPA2
HomeS2000	Infra	6	54 Mbit/s	7	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA1 WPA2
		7	54 Mbit/s	7	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA1 WPA2
		11	54 Mbit/s	7	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA1 WPA2
		11	54 Mbit/s	7	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA1 WPA2
		10	54 Mbit/s	4	<div><div></div><div></div><div></div><div></div><div></div></div>	WPA2



Linux :
Terminal: nmcli d wifi
Kismet,
PRTG network monitor

Rutere WiFi

Funcții

Funcții:

- Punct de acces;
- Switch pentru nivelul fizic
- Filtrare de pachete
- Access parental

SSID – numele fiecărei rețele

Benzi de frecvență:

- 2.4 GHz
- 5 GHz
- 60GHz

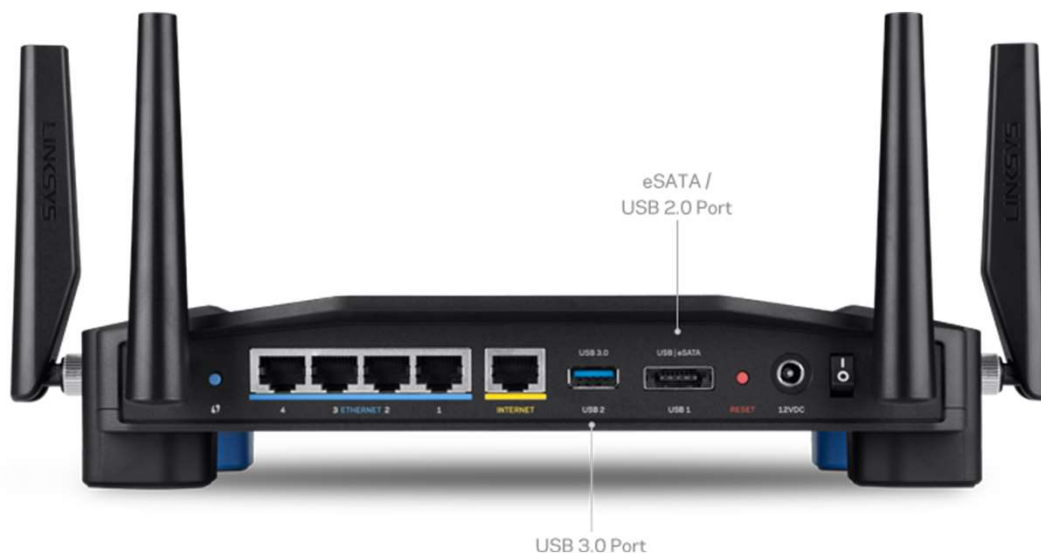
Securitate:

- None – mereu o idee proastă;
- AES
- WPA2

În laborator ne jucăm cu ruterele:

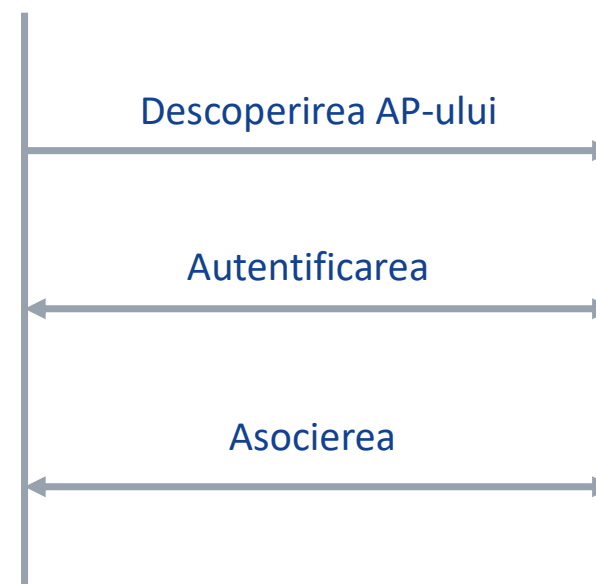
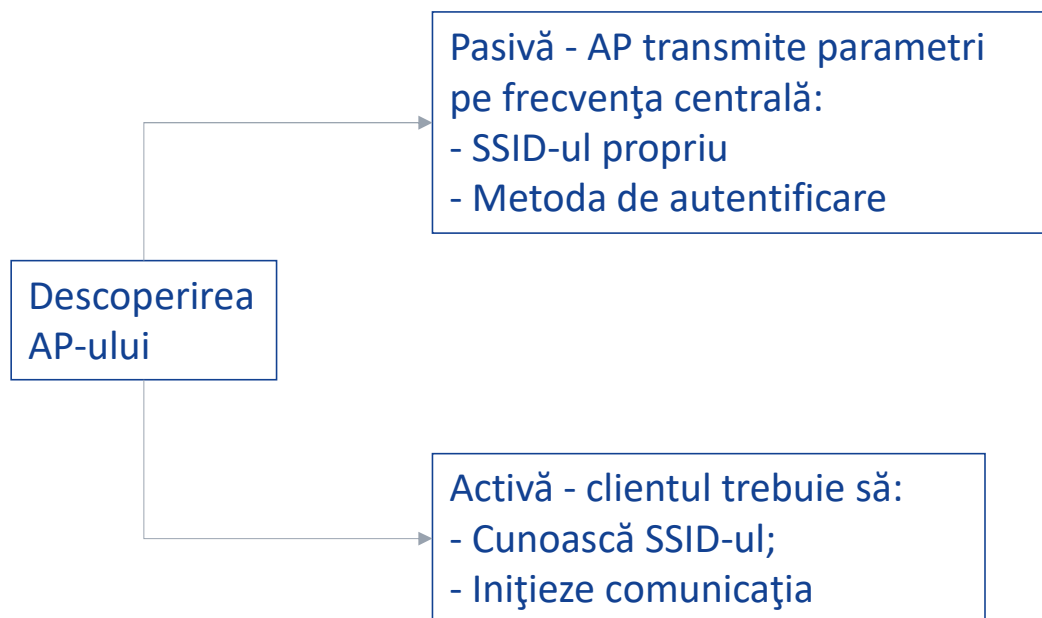
- Mercursys MW301R;
- Tenda F3

Manualele disponibile pe CV.



Rutare WiFi

Atașarea la un ruter




Rutere WiFi


Quick setup

netis


Select Language

 Advanced

Quick Setup

**Internet Connection Type**

☒ DHCP ☐ Static IP ☐ PPPoE ☐ Other


**Wireless Setup**

SSID :	cisco_network
Security :	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Password :	Cisco_031 (Please enter 8-63 characters.)

Save

Rutere WiFi WAN Config

As detected, your connection type is: **PPPoE**



Internet Settings


Connection Type

☒ PPPoE
 ☐ Dynamic IP
 ☐ Static IP

Select PPPoE if your Internet connection asks for the user name and password.

User Name

Password



Wireless Settings

WiFi Name

WiFi Password

OK

WAN – ceea ce vine de la operator:


→ PPPoE – necesită user și parolă

→ Dynamic IP – MAC-urile sunt înregistrate la nivelul operatorului

→ Static IP – necesită parametri Ip

Rutare WiFi PPPoE - Nokia

PPPoE – necesită user și
parolă



[Ethernet Gateway](#)
[Logout](#)
[English](#) | [Español](#)

Status

Network

LAN

LAN_IPv6

WAN

WAN DHCP

Wireless (2.4GHz)

Wireless (5GHz)

Wireless Schedule

IP Routing

DNS

TR-069

QoS Config

Security

Application

Maintenance

RG Troubleshooting

WAN Connection List

Connection Type

IP mode

Enable/Disable

NAT

Service

Enable VLAN

VLAN ID

VLAN PRI

WAN IP Mode

Connection Trigger

Username

Password

Keep Alive Time

Keep Alive Retry

Echo Value

Manual DNS

1_TR069_INTERNET_OTHER_R_VID_881

☐ IPoE
 ☒ PPPoE

IPv4

☒

☒

☒ TR-069 ☒ INTERNET ☒ IPTV

☒

881

7

PPPoE

AlwaysOn

user

.....

60

(5~60)seconds

3

(1~10)times


180

Save

Delete

Rutere WiFi WAN –IP static

As detected, your connection type is: **Static IP**



Internet Settings

Connection Type

☐ PPPoE
 ☐ Dynamic IP
 ☒ Static IP

Select Static IP if your Internet connection asks for static IP info.


IP Address

Subnet Mask

Default Gateway

Preferred DNS

Alternative DNS



Wireless Settings

WiFi Name

WiFi Password

OK

Trebuie să știm TOȚI parametri Ip

WAN Settings

?

Connection Type	Static IP	Auto Detect
IP Address	<input type="text" value="0.0.0.0"/>	
Subnet Mask	<input type="text" value="0.0.0.0"/>	
Gateway	<input type="text" value="0.0.0.0"/>	
Primary DNS	<input type="text" value="0.0.0.0"/>	
Secondary DNS	<input type="text" value="0.0.0.0"/>	Optional
MTU Size (in bytes)	<input type="text" value="1500"/>	The default value is 1500. Do NOT change unless necessary.
WAN Rate Settings	Auto Negotiation	

✓
Save

Pentru Tenda & Mercursys

Rutare WiFi

Configurația Wireless

Parametri WiFi:

- SSID
- Securitatea
- Parola

Ce face funcția
“Hide WiFi”?


UPC9063546	38:43:7D:8C:57:31	-83	6	300 Mbps	PSK-(TKIP CCMP)	PSK-(TKIP CCMP)	1.0	Compal Broadband Network
[Hidden]	62:45:B0:7A:32:CD	-79	165+165	N/A SharedKey				
HUAWEI-H64y	7C:A2:3E:97:63:2C	-83	1	144.4 Mbps	PSK-(TKIP CCMP)	PSK-(TKIP CCMP)		HUAWEI TECHNOLOGIES

Rutare WiFi

Configurația Wireless

Parametri WiFi:

- Setarea benzii (2.4 sau 5GHz)
- Meniurile sunt similare pentru cele 2
- **Atenție: anumite rutere permit selectarea manuală a canalelor**
- Numărul maxim de utilizatori



Ethernet Gateway
 Logout
 English | Español

Network > Wireless (2.4GHz)

Status	Enable	<input checked="" type="checkbox"/>
Network	Mode	auto(b/g/n)
LAN	Bandwidth	20MHz
LAN IPv6	Channel	Auto
WAN	Transmitting Power	100%
WAN DHCP	WMM	Enable
Wireless (2.4GHz)	Total MAX Users	32
Wireless (5GHz)		
Wireless Schedule		
IP Routing		
DNS		
TR-069		
QoS Config		
Security		
Application		
Maintenance		
RG Troubleshooting		

SSID Configuration

SSID Select	SSID1
SSID Name	NOKIA-0580
Enable SSID	Enable
SSID Broadcast	Enable
MAX Users	32
Encryption Mode	WPA/WPA2 Personal
WPA Version	WPA2
WPA Encryption Mode	AES
WPA Key	••••••••
	<input checked="" type="checkbox"/> Show password
Enable WPS	Enable
WPS Mode	PBC
WPS Connect	
Save Refresh	

Rutere WiFi

Selecția Canalelor

WiFi Schedule

WiFi Schedule ☒ Enable ☐ Disable

Turn WiFi off during : ~ :

Repeat ☐ Everyday ☒ Mon ☒ Tue ☒ Wed ☒ Thu ☒ Fri ☐ Sat ☐ Sun

Wireless Parameters

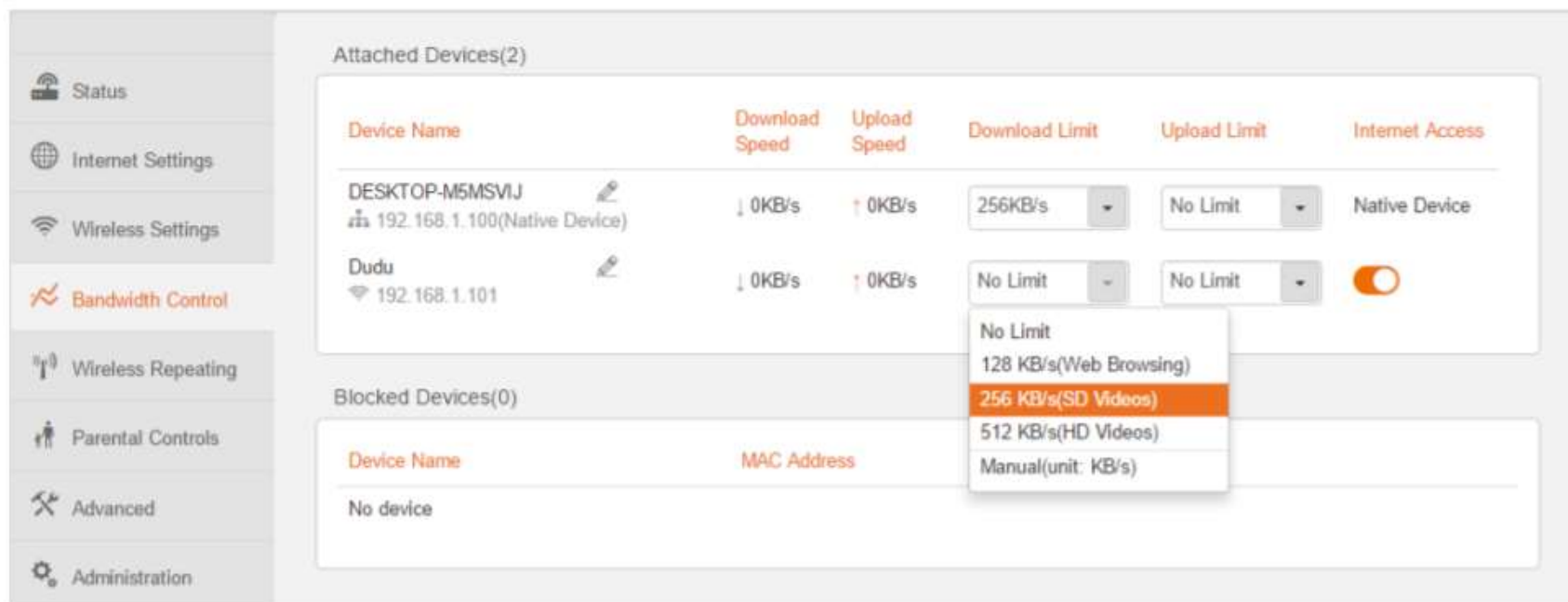
Network Option

Wireless Channel Current Channel: 13

Channel Width Current Channel Width: 20MHz

Rutare WiFi

Controlul lățimii de bandă



Device Name	Download Speed	Upload Speed	Download Limit	Upload Limit	Internet Access
DESKTOP-M5MSVIJ 192.168.1.100(Native Device)	↓ 0KB/s	↑ 0KB/s	256KB/s	No Limit	Native Device
Dudu 192.168.1.101	↓ 0KB/s	↑ 0KB/s	No Limit	No Limit	<input checked="" type="checkbox"/>

Blocked Devices(0)

Device Name	MAC Address
No device	

Putem limita debitul pentru fiecare utilizator

Rutare WiFi

Control parental

Status

Internet Settings

Wireless Settings

Bandwidth Control

Wireless Repeating

Parental Controls

Advanced

Administration

Attached Devices

Device Name	IP Address	Online Duration	Manage
Dudu	192.168.1.101	30m 58s	<input checked="" type="checkbox"/>
DESKTOP-M5MSVIJ	192.168.1.100	34m 36s	<input checked="" type="checkbox"/>

Access Restrictions

Settings below will be applied to all managed devices

Allow access during

20 : 00 ~ 22 : 00

Repeat

☐ Everyday
 ☒ Mon
 ☒ Tue
 ☒ Wed
 ☒ Thu
 ☒ Fri
 ☐ Sat
 ☐ Sun

Website Restrictions

Only Forbid

Websites Specified

+Add

1 youtube


OK

Cancel

Ce se întâmplă aici?

Rutere WiFi

Control parental - Nokia



- Status
- Network
- Security**
 - Firewall
 - MAC Filter
 - IP Filter
 - URL Filter**
 - Parental Control
 - DMZ and ALG
 - Access Control
 - Application
 - Maintenance
 - RG Troubleshooting

Ethernet Gateway
 Logout
 English | Español

Security>URL Filter

URL Filter-- please select the type of filter and then configure the URL. Support up to 100 URL filters.

Enable URL filter ☐

URL filter type: ☒ Block ☐ Allow


URL List

URL Address	Port Number	Delete
URL Address <input type="text"/>	Port – default to 80 <input type="text"/>	<input type="button" value="Add Filter"/>

Aici ce se întâmplă?

Rutere WiFi

Control parental - Nokia



Ethernet Gateway
 Logout
 [English](#) | [Español](#)

Security>Parental Control

Block access of LAN devices at given times, according to their MAC or IPv4 addresses

Access Control ☐

Policy Name	Device	IP	Days Of Week	From	To	Delete	Edit	Enable
+								

Status
 Network
 Security
 Firewall
 MAC Filter
 IP Filter
 URL Filter
 Parental Control
 DMZ and ALG
 Access Control
 Application
 Maintenance
 RG Troubleshooting

Aici ce se întâmplă?



That's all for today, see you next time!