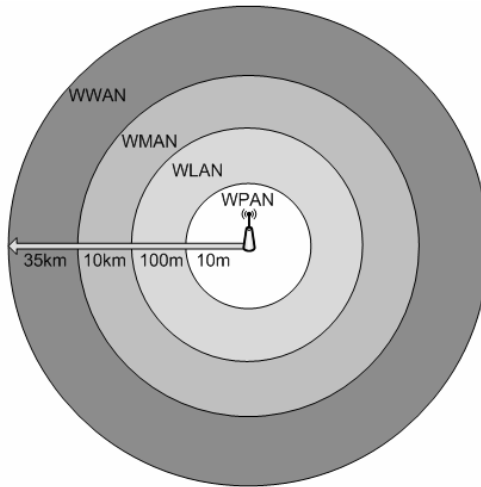


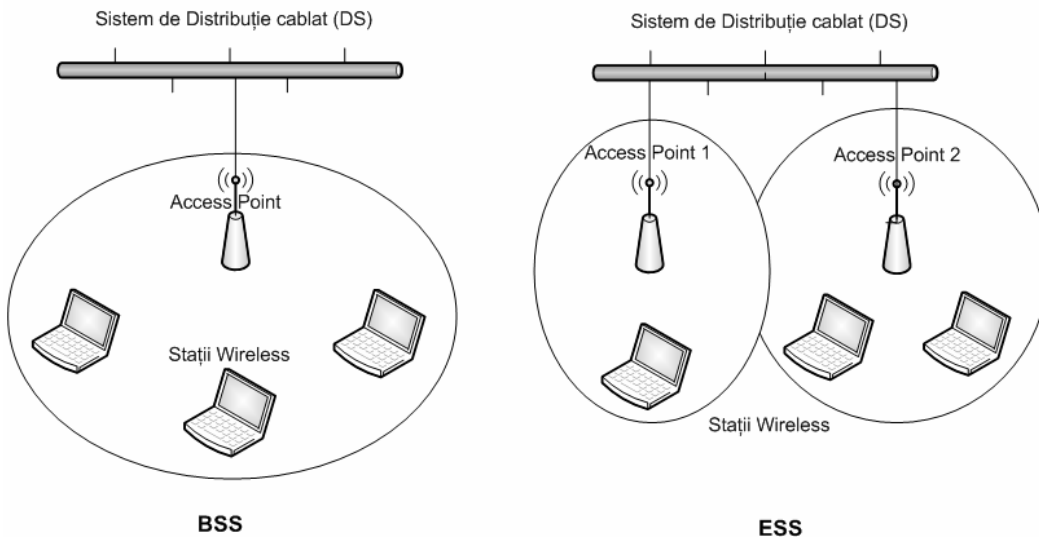
III. Conectarea la rețea

Topologii wireless

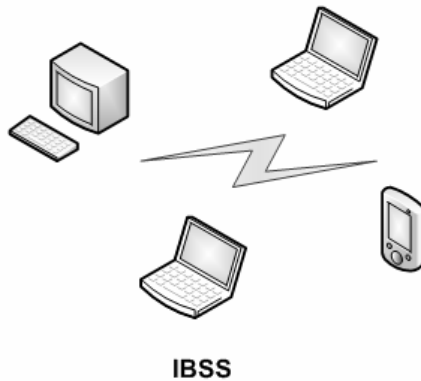


IEEE 802.11

- 2.4GHz *Industrial, Scientific, and Medical (ISM)*
- 5GHz *Unlicensed National Information Infrastructure (U-NII)*
- Multiple-Input-Multiple-Output (MIMO)
- Mod infrastructură



- Mod ad-hoc



WiFi Standards and channels allocation

Europe: European Telecommunications Standards Institute (ETSI)

USA: Federal Communications Commission (FCC)

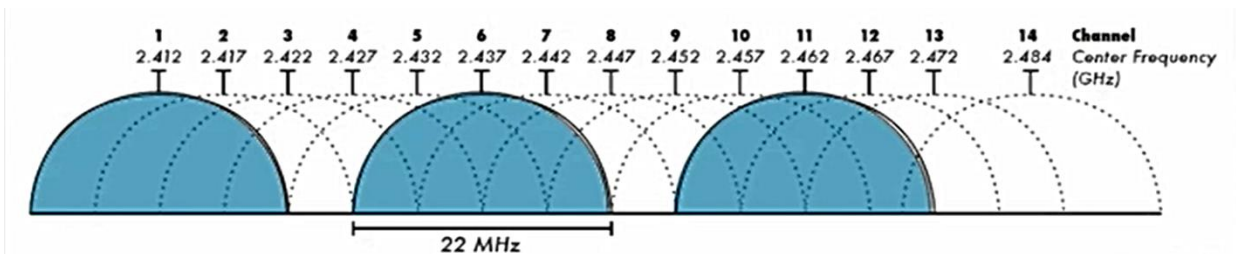
	802.11n	802.11n IEEE Specification	802.11ac Wave 1 Today	802.11ac Wave2 WFA Certification Process Continues	802.11ac IEEE Specification
Band	2.4 GHz & 5 GHz	2.4 GHz & 5 GHz	5 GHz	5 GHz	5 GHz
MIMO	Single User (SU)	Single User (SU)	Single User (SU)	Multi User (MU)	Multi User (MU)
PHY Rate	450 Mbps	600 Mbps	1.3 Gbps	2.34 Gbps - 3.47 Gbps	6.9 Gbps
Channel Width	20 or 40 MHz	20 or 40 MHz	20, 40, 80 MHz	20, 40, 80, 80-80, 160 MHz	20, 40, 80, 80-80, 160 MHz
Modulation	64 QAM	64 QAM	256 QAM	256 QAM	256 QAM
Spatial Streams	3	4	3	3-4	8
MAC Throughput*	293 Mbps	390 Mbps	845 Mbps	1.52 Gbps- 2.26 Gbps	4.49 Gbps

* Assuming a 65% MAC efficiency with highest MCS

Table 1. Calculating the speed of 802.11ac and 802.11ax

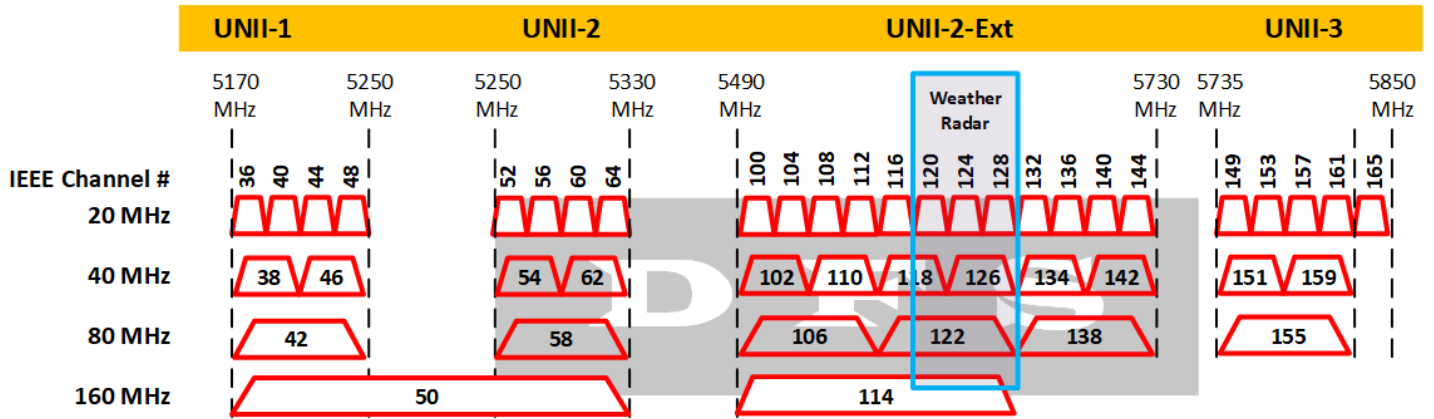
PHY	Bandwidth (as number of data subcarriers)	Data bits per subcarrier	Time per OFDM symbol (800ns GI)	1 SS	3 SS	4 SS	8 SS
802.11ac	234 (80 MHz)	$5/6 \times \log_2(256)$ ≈ 6.67	4 μ s	390 Mbps	1.17 Gbps	1.56 Gbps	-
	2 x 234 (160 MHz)	X	/	= 780 Mbps	-	3.12 Gbps	-
802.11ax	980 (80 MHz)	$5/6 \times \log_2(1024)$ ≈ 8.33	13.6 μ s	600 Mbps	1.8 Gbps	2.4 Gbps	4.8 Gbps
	2 x 980 (160 MHz)			1.2 Gbps	3.6 Gbps	4.8 Gbps	-

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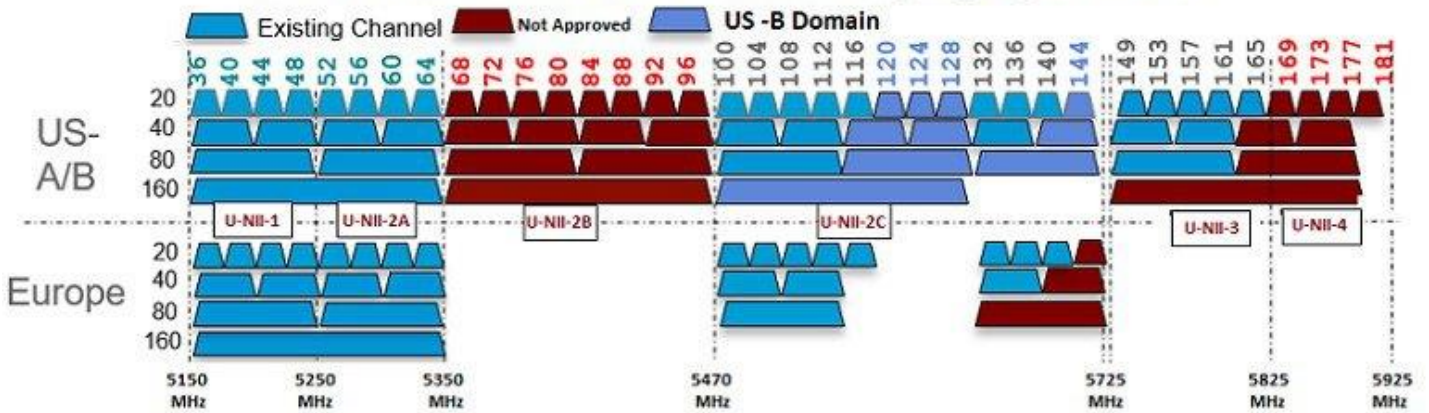
EU: 13 channels (1-13)

USA: 11 channels (1-11)



5 GHz Channels, with DFS and Weather Radar Restrictions

U-NII 5 GHz Channel Bandwidths 20/40/80/160 MHz



WLAN channels in North America and Europe

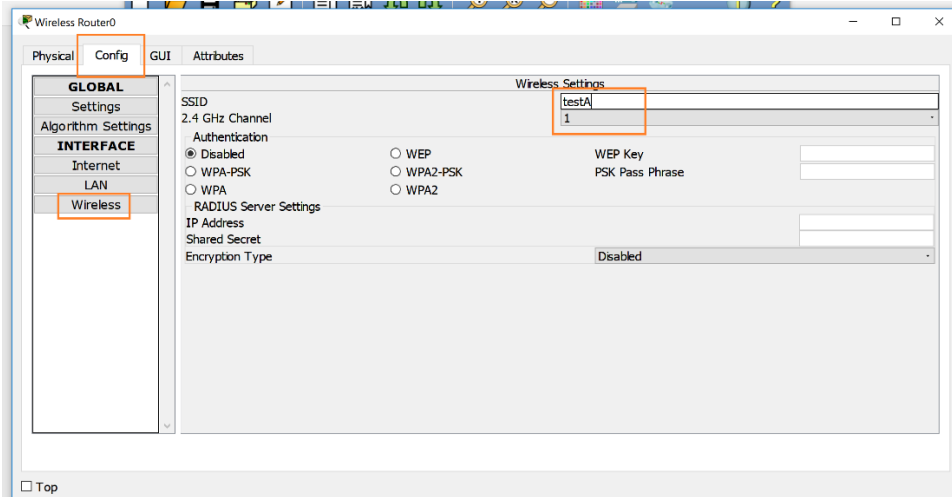
		2.4 GHz spectrum												
Europe	EIRP	100 mW												
USA / Canada	EIRP	125 mW												
Channel		1	2	3	4	5	6	7	8	9	10	11	12	13
Channelwidth	[MHz]	5	5	5	5	5	5	5	5	5	5	5	5	5
Frequency	[MHz]	2					2					2		2
		4					4					4		4
		0					3					5		7
		7					2					7		2

		5 GHz spectrum																								
Europe	Primary User	ATC										TWDR / ATC			ATC											
	Requirements	only allowed with DFS / TPC																								
	In-/Outdoor	only Indoor								Indoor / Outdoor																
	EIRP	max 200 mW								max 1000 mW																
USA / Canada	Primary User											TWDR / ATC														
	Requirements	only allowed with DFS																								
	In-/Outdoor	Indoor / Outdoor																								
	EIRP	max 200 mW								max 1000 mW									max 4000 mW							
Channel		UNII-1				UNII-2				UNII-2 extended									Upper ISM							
Channelwidth	[MHz]	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Frequency	[MHz]	5				5				5																5
		1				2				5																7
		8				6				0																8
						0				0																4
						0				0																5

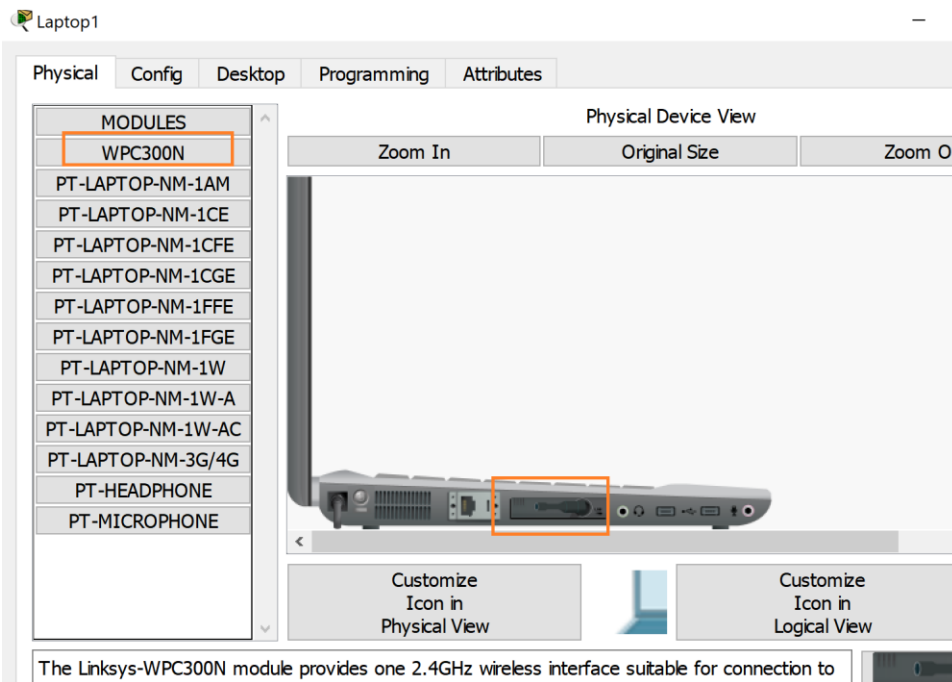
Testarea interferentelor WiFi in Packet Tracer

Topologie initiala:

-1 router Linksys WRT300N, cu SSID testA, canal 1 (22MHz wide)

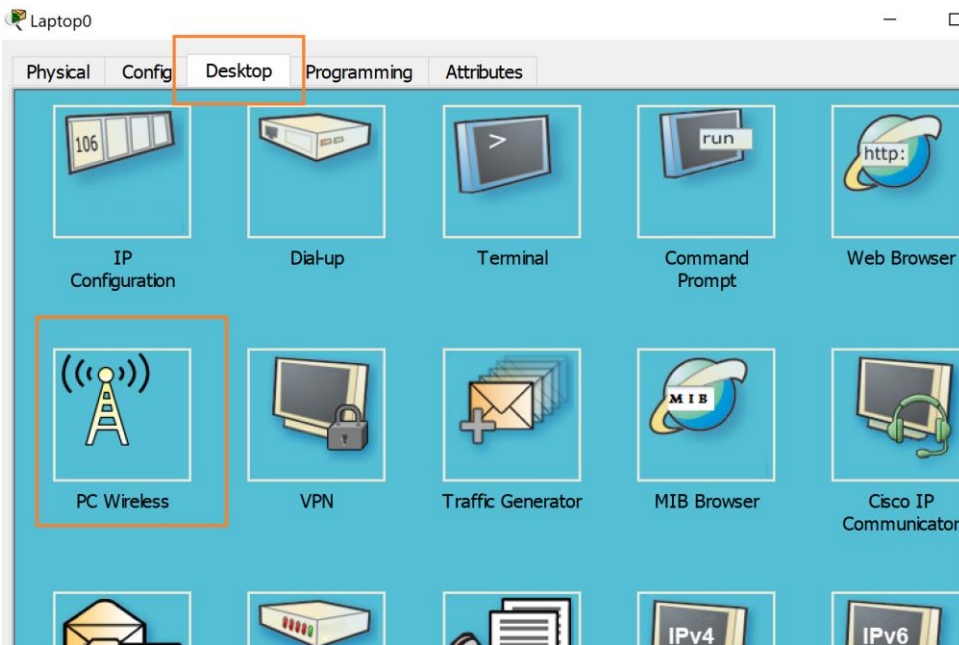


-1 Laptop cu interfata WiFi WPC300N



Testare

Pas1. Se va verifica, la nivelul laptopului (setarea PC Wireless, tab Connect), nivelul semnalului receptionat (Semnal aprox 100%)



Pas2. Se va adauga un nou router Linksys WRT300N, cu SSID testB, canal 1 (22MHz wide). Se va verifica nivelul semnalului receptionat de catre laptop

Pas3. Se vor adauga alte doua routere Linksys WRT300N, cu SSID testC, respective testD, canal 1 (22MHz wide). Se va verifica nivelul semnalului receptionat de catre laptop.

Pas4. Se va schimba canalul setat la pasii anteriori, astfel incat nivelul semnalului receptionat sa fie maximizat.