Vistula University
Mobile Technologies 2020/2021
Final Project
Measurement and optimization of home Wi-Fi network

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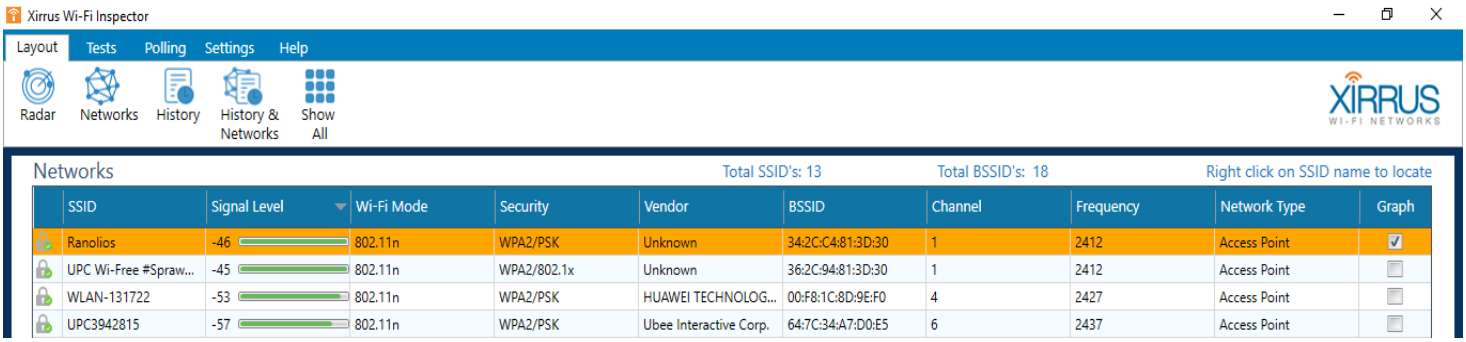
(I dont have any team)

Project Description:

-Measuring the home Wi-Fi network
-Selection of the optimal channel from the point of view of each room
-Determining the signal strength in both rooms
-Determination of noise power N+I and S/N+I

1. At first, I installed “Xirrus Wi-Fi inspector” and I measured my apartment Wi-fi. As you can see in the picture my network is Ranolios.



Room1

As you can see there is also other networks there also.
Signal Level: -46 dBm
Channel: 1
Frequency: 2.4 GHz

NOT FIND CHANEL	
Another channel	
1.RaNOLIOS	
2.UPCWIFEE-FREE#SPRAW1	
3.UPC240511086	
4.UPCWIFEE-FREE#SPRAW2	

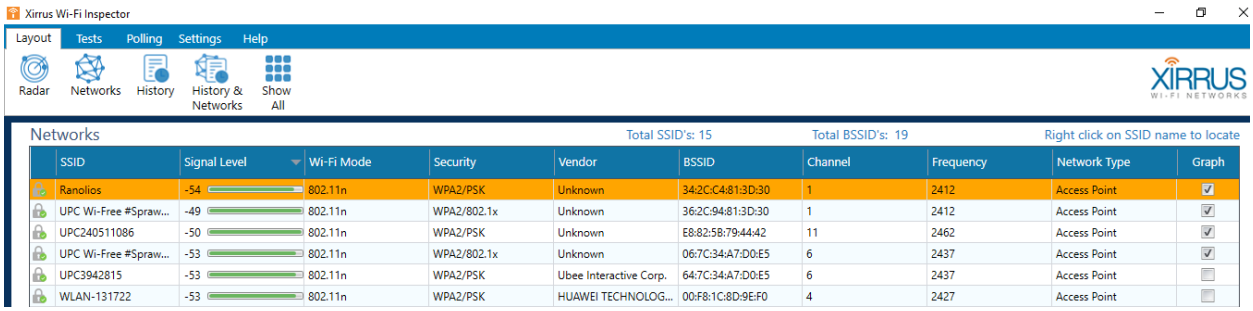
2. Calculating Noise Power (N+I):

SID/CHANNEL	channel 1	channel 2	channel 3	channel 4	channel 5	channel 6	channel 7	channel 8	channel 9	channel 10	channel 11	channel 12
.RaNOLIOS	251.19	188.39	125.59	62.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.UPCWI-FI#	316.23	237.17	158.11	79.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.WLAN-131722	12.53	25.06	37.59	50.12	37.59	25.06	12.53	0.00	0.00	0.00	0.00	0.00
.UPC3942815	0.00	0.00	4.99	9.98	14.96	19.95	14.96	9.98	4.99	0.00	0.00	0.00
other1	0.05	0.04	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
other2	0.50	0.38	0.25	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
other3	0.00	0.00	3.96	7.92	11.89	15.85	11.89	7.92	3.96	0.00	0.00	0.00
other4	0.00	0.00	0.00	0.03	0.05	0.08	0.10	0.08	0.05	0.03	0.00	0.00
other5	0.00	0.00	0.00	0.03	0.05	0.08	0.10	0.08	0.05	0.03	0.00	0.00
other6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25	2.51	3.76	5.01	3.76
other7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.13	0.19	0.25	0.19
other8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.06	0.09	0.13	0.09
other9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.08	0.10	0.08
UN(N+I) mW	329.31	262.64	204.93	147.26	64.54	61.01	39.58	19.42	11.79	4.17	5.49	4.12
INR(dB)=SIGNAL/(N+I)	-1.18	-0.19	0.88	2.32	5.90	6.15	8.03	11.12	13.28	17.80	16.61	17.85
UN(N+I) dBm	-44.82	-45.81	-46.88	-48.32	-51.90	-52.15	-54.03	-57.12	-59.28	-63.80	-62.61	-63.85

Result Room1:

The least noise is in channels 10,11,12 So it is better to optimize our network in these as we can see the SINR in these channels are also high. Now our network "Ranalios" is in channel 1 which there is high interference and noise and as the result, the SINR is too bad and low, so it need to be optimized.

Room2



As you can see there is also other networks there also.
Signal Level: -54 dBm
Channel: 1
Frequency: 2.4 GHz

NOT FIND CHANEL	
Other chanel	
1.RaNOLIOS	
2.UPCWIFEE-FREE#SPRAW1	
3.UPC240511086	
4.UPCWIFEE-FREE#SPRAW2	

2. Calculating Noise Power (N+I):

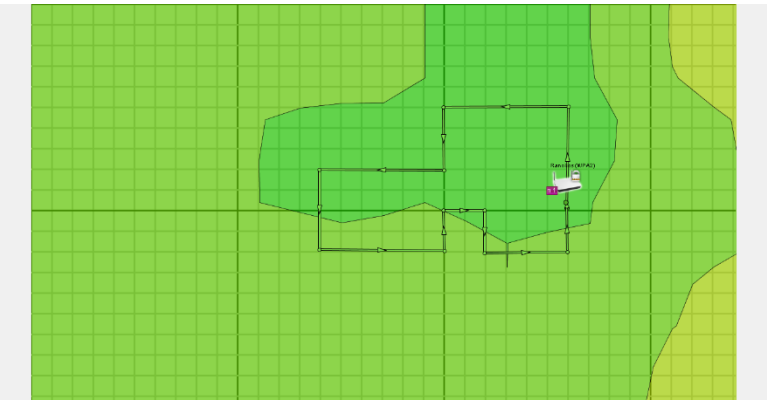
SSID/CHANNEL	channel 1	channel 2	channel 3	channel 4	channel 5	channel 6	channel 7	channel 8	channel 9	channel 10	channel 11	channel 12
1.RaNOLIOS	39.81	29.86	19.91	9.95								
2.UPCWI-FI#	125.89	94.42	62.95	31.47								
3.UPC240511086								25.00	50.00	75.00	100.00	75.00
4.WLAN-131722			12.53	25.06	37.59	50.12	37.59	25.06	12.53			
other1	0.63	0.47	0.32	0.16								
other2	0.13	0.09	0.06	0.03								
other3	12.53	25.06	37.59	50.12	37.59	25.06	12.53					
other4		12.53	25.06	37.59	50.12	37.59	25.06	12.53				
other5			0.13	0.25	0.38	0.50	0.38	0.25	0.13			
other6			0.10	0.20	0.30	0.40	0.30	0.20	0.10			
other7								0.01	0.02	0.02	0.03	0.02
other8								0.02	0.04	0.06	0.08	0.06
other9								0.04	0.08	0.12	0.16	0.12
SUN(N+I) mW	139.18	132.58	138.73	144.88	125.97	113.67	75.85	63.11	62.89	75.20	100.27	75.20
SINR(dB)=SIGNAL/(N+I)	-5.44	-5.22	-5.42	-5.61	-5.00	-4.56	-2.80	-2.00	-1.99	-2.76	-4.01	-2.76
SUN(N+I) dBm	-48.56	-48.78	-48.58	-48.39	-49.00	-49.44	-51.20	-52.00	-52.01	-51.24	-49.99	-51.24

Result Room2:

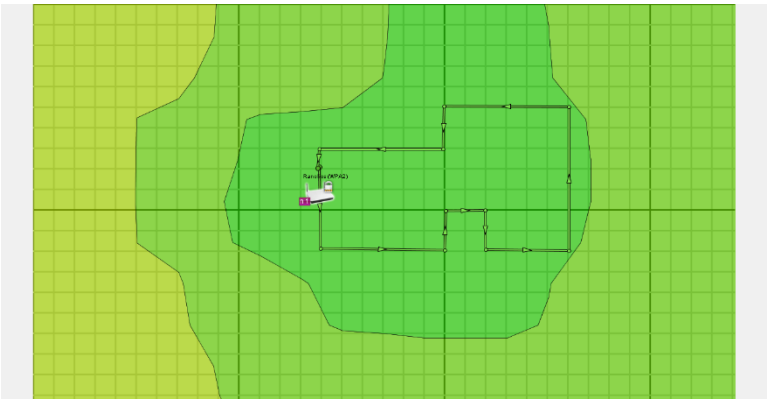
Although The least noise is in channels 10,9,8,7 by the highest SINR among all other channels in which channel 9 is the best, but still their SINR is very low. Now our network "Ranalios" is in channel 1 which there is high interference and noise in all the available channels from the room2 point of view, so most probably due to high interference, it is not suggested to place the device in this room as it is not observed for any possible optimization which led to a good SINR.

3. Now by using “EkaHau Heat Mapper” application

Room2



Room1



CONCLUSION:

from both rooms point of view it is suggested to place the device in room 1 and plane it in channel 10 in which is the best for room 1 and among the highest for room 2.

Thank you.