

# 報告書参考資料集 (案)

## 目 次

RESOLUTION229 (Rev. WRC-12) . . . . .	1
IEEE802.11ac の規定について . . . . .	7
無線 LAN 測定結果 . . . . .	11
無線 LAN 出荷台数 . . . . .	20
実環境における無線 LAN システム間の共用について . . . . .	22

# RESOLUTION229 (Rev. WRC-12)

RESOLUTION 229 (Rev.WRC-12)

**Use of the bands 5 150-5 250 MHz, 5 250-5 350 MHz and  
5 470-5 725 MHz  
by the mobile service for the implementation of wireless access systems  
including radio local area networks**

The World Radiocommunication Conference (Geneva, 2012),

*considering*

- a) that WRC-03 allocated the bands 5 150-5 350 MHz and 5 470-5 725 MHz on a primary basis to the mobile service for the implementation of wireless access systems (WAS), including radio local area networks (RLANs);
- b) that WRC-03 decided to make an additional primary allocation for the Earth exploration-satellite service (EESS) (active) in the band 5 460-5 570 MHz and space research service (SRS) (active) in the band 5 350-5 570 MHz;
- c) that WRC-03 decided to upgrade the radiolocation service to a primary status in the 5 350-5 650 MHz band;
- d) that the band 5 150-5 250 MHz is allocated worldwide on a primary basis to the fixed-satellite service (FSS) (Earth-to-space), this allocation being limited to feeder links of non-geostationary-satellite systems in the mobile-satellite service (No. **5.447A**);
- e) that the band 5 150-5 250 MHz is also allocated to the mobile service, on a primary basis, in some countries (No. **5.447**) subject to agreement obtained under No. **9.21**;
- f) that the band 5 250-5 460 MHz is allocated to the EESS (active) and the band 5 250-5 350 MHz to the SRS (active) on a primary basis;
- g) that the band 5 250-5 725 MHz is allocated on a primary basis to the radiodetermination service;
- h) that there is a need to protect the existing primary services in the 5 150-5 350 MHz and 5 470-5 725 MHz bands;
- i) that results of studies in ITU-R indicate that sharing in the band 5 150-5 250 MHz between WAS, including RLANs, and the FSS is feasible under specified conditions;
- j) that studies have shown that sharing between the radiodetermination and mobile services in the bands 5 250-5 350 MHz and 5 470-5 725 MHz is only possible with the application of mitigation techniques such as dynamic frequency

selection;

k) that there is a need to specify an appropriate e.i.r.p. limit and, where necessary, operational restrictions for WAS, including RLANs, in the mobile service in the bands 5 250-5 350 MHz and 5 470-5 570 MHz in order to protect systems in the EESS (active) and SRS (active);

l) that the deployment density of WAS, including RLANs, will depend on a number of factors including intrasystem interference and the availability of other competing technologies and services,

*further considering*

a) that the interference from a single WAS, including RLANs, complying with the operational restrictions under *resolves* 2 will not on its own cause any unacceptable interference to FSS receivers on board satellites in the band 5 150-5 250 MHz;

b) that such FSS satellite receivers may experience an unacceptable effect due to the aggregate interference from these WAS, including RLANs, especially in the case of a prolific growth in the number of these systems;

c) that the aggregate effect on FSS satellite receivers will be due to the global deployment of WAS, including RLANs, and it may not be possible for administrations to determine the location of the source of the interference and the number of WAS, including RLANs, in operation simultaneously,

*noting*

a) that, prior to WRC-03, a number of administrations have developed regulations to permit indoor and outdoor WAS, including RLANs, to operate in the various bands under consideration in this Resolution;

b) that, in response to Resolution **229 (WRC-03)**, ITU-R developed Report ITU-R M.2115, which provides testing procedures for implementation of dynamic frequency selection,

*recognizing*

a) that in the band 5 600-5 650 MHz, ground-based meteorological radars are extensively deployed and support critical national weather services, according to footnote No. **5.452**;

b) that the means to measure or calculate the aggregate pfd level at FSS satellite receivers specified in Recommendation ITU-R S.1426 are currently under study;

c) that certain parameters contained in Recommendation ITU-R M.1454

related to the calculation of the number of RLANs tolerable by FSS satellite receivers operating in the band 5 150-5 250 MHz require further study;

d) that the performance and interference criteria of spaceborne active sensors in the EESS (active) are given in Recommendation ITU-R RS.1166;

e) that a mitigation technique to protect radiodetermination systems is given in Recommendation ITU-R M.1652;

f) that an aggregate pfd level has been developed in Recommendation ITU-R S.1426 for the protection of FSS satellite receivers in the 5 150-5 250 MHz band;

g) that Recommendation ITU-R RS.1632 identifies a suitable set of constraints for WAS, including RLANs, in order to protect the EESS (active) in the 5 250-5 350 MHz band;

h) that Recommendation ITU-R M.1653 identifies the conditions for sharing between WAS, including RLANs, and the EESS (active) in the 5 470-5 570 MHz band;

i) that the stations in the mobile service should also be designed to provide, on average, a near-uniform spread of the loading of the spectrum used by stations across the band or bands in use to improve sharing with satellite services;

j) that WAS, including RLANs, provide effective broadband solutions;

k) that there is a need for administrations to ensure that WAS, including RLANs, meet the required mitigation techniques, for example, through equipment or standards compliance procedures,

*resolves*

1 that the use of these bands by the mobile service will be for the implementation of WAS, including RLANs, as described in the most recent version of Recommendation ITU-R M.1450;

2 that in the band 5 150-5 250 MHz, stations in the mobile service shall be restricted to indoor use with a maximum mean e.i.r.p.<sup>1</sup> of 200 mW and a maximum mean e.i.r.p. density of 10 mW/MHz in any 1 MHz band or equivalently 0.25 mW/25 kHz in any 25 kHz band;

3 that administrations may monitor whether the aggregate pfd levels given

<sup>1</sup> In the context of this Resolution, “mean e.i.r.p.” refers to the e.i.r.p. during the transmission burst which corresponds to the highest power, if power control is implemented.

in Recommendation ITU-R S.1426<sup>2</sup> have been, or will be exceeded in the future, in order to enable a future competent conference to take appropriate action;

4 that in the band 5 250-5 350 MHz, stations in the mobile service shall be limited to a maximum mean e.i.r.p. of 200 mW and a maximum mean e.i.r.p. density of 10 mW/MHz in any 1 MHz band. Administrations are requested to take appropriate measures that will result in the predominant number of stations in the mobile service being operated in an indoor environment. Furthermore, stations in the mobile service that are permitted to be used either indoors or outdoors may operate up to a maximum mean e.i.r.p. of 1 W and a maximum mean e.i.r.p. density of 50 mW/MHz in any 1 MHz band, and, when operating above a mean e.i.r.p. of 200 mW, these stations shall comply with the following e.i.r.p. elevation angle mask where  $\theta$  is the angle above the local horizontal plane (of the Earth):

$-13 \text{ dB(W/MHz)}$	for $0^\circ \leq \theta < 8^\circ$
$-13 - 0.716(\theta - 8) \text{ dB(W/MHz)}$	for $8^\circ \leq \theta < 40^\circ$
$-35.9 - 1.22(\theta - 40) \text{ dB(W/MHz)}$	for $40^\circ \leq \theta \leq 45^\circ$
$-42 \text{ dB(W/MHz)}$	for $45^\circ < \theta$ ;

5 that administrations may exercise some flexibility in adopting other mitigation techniques, provided that they develop national regulations to meet their obligations to achieve an equivalent level of protection to the EESS (active) and the SRS (active) based on their system characteristics and interference criteria as stated in Recommendation ITU-R RS.1632;

6 that in the band 5 470-5 725 MHz, stations in the mobile service shall be restricted to a maximum transmitter power of 250 mW<sup>3</sup> with a maximum mean e.i.r.p. of 1 W and a maximum mean e.i.r.p. density of 50 mW/MHz in any 1 MHz band;

7 that in the bands 5 250-5 350 MHz and 5 470-5 725 MHz, systems in the mobile service shall either employ transmitter power control to provide, on average, a mitigation factor of at least 3 dB on the maximum average output power of the systems, or, if transmitter power control is not in use, then the maximum mean e.i.r.p. shall be reduced by 3 dB;

<sup>2</sup>  $-124 - 20 \log_{10} (h_{SAT}/1\ 414) \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$ , or equivalently,  $-140 - 20 \log_{10} (h_{SAT}/1\ 414) \text{ dB(W/(m}^2 \cdot 25 \text{ kHz))}$ , at the FSS satellite orbit, where  $h_{SAT}$  is the altitude of the satellite (km).

<sup>3</sup> Administrations with existing regulations prior to WRC-03 may exercise some flexibility in determining transmitter power limits.

8 that, in the bands 5 250-5 350 MHz and 5 470-5 725 MHz, the mitigation measures found in Annex 1 to Recommendation ITU-R M.1652-1 shall be implemented by systems in the mobile service to ensure compatible operation with radiodetermination systems,

*invites administrations*

to adopt appropriate regulation if they intend to permit the operation of stations in the mobile service using the e.i.r.p. elevation angle mask in *resolves* 4, to ensure the equipment is operated in compliance with this mask,

*invites ITU-R*

1 to continue work on regulatory mechanisms and further mitigation techniques to avoid incompatibilities which may result from aggregate interference into the FSS in the band 5 150-5 250 MHz from a possible prolific growth in the number of WAS, including RLANs;

2 to continue studies on mitigation techniques to provide protection of EESS from stations in the mobile service,

3 to continue studies on suitable test methods and procedures for the implementation of dynamic frequency selection, taking into account practical experience.



# IEEE802.11ac の規定について

IEEE 802.11ac 規定について  
(IEEE P802.11TGac D3.0 抜粋)

1 各チャネル幅についての規定について

(1) IEEE802.11ac でサポートされるチャネル幅の一覧についての記述:

(p.180/28~30 行目)

The VHT PHY provides support for 20 MHz, 40 MHz, 80 MHz and 160 MHz contiguous channel widths and support for 80+80 MHz non-contiguous channel width.

→ VHT PHY(11ac 規格で定義される物理レイヤ)は 20/40/80/160MHz 幅の連続スペクトルチャネルおよび 80+80MHz 幅の不連続チャネルをサポートする。

(2) 80MHz 伝送が必須要件であることについての記述:

(IEEE P802.11TGac D3.0 p.180/37~42 行目)

A VHT STA shall support:

– 20 MHz, 40 MHz and 80 MHz channel widths

→ VHT STA(11ac 規格をサポートする端末)は 20/40/80MHz 幅のチャネルをサポートしなければならない。

(3) 160MHz/80+80MHz 伝送がオプションであることについての記述:

(IEEE P802.11TGac D3.0 p.180/44~60 行目)

A VHT STA may optionally support:

(略)

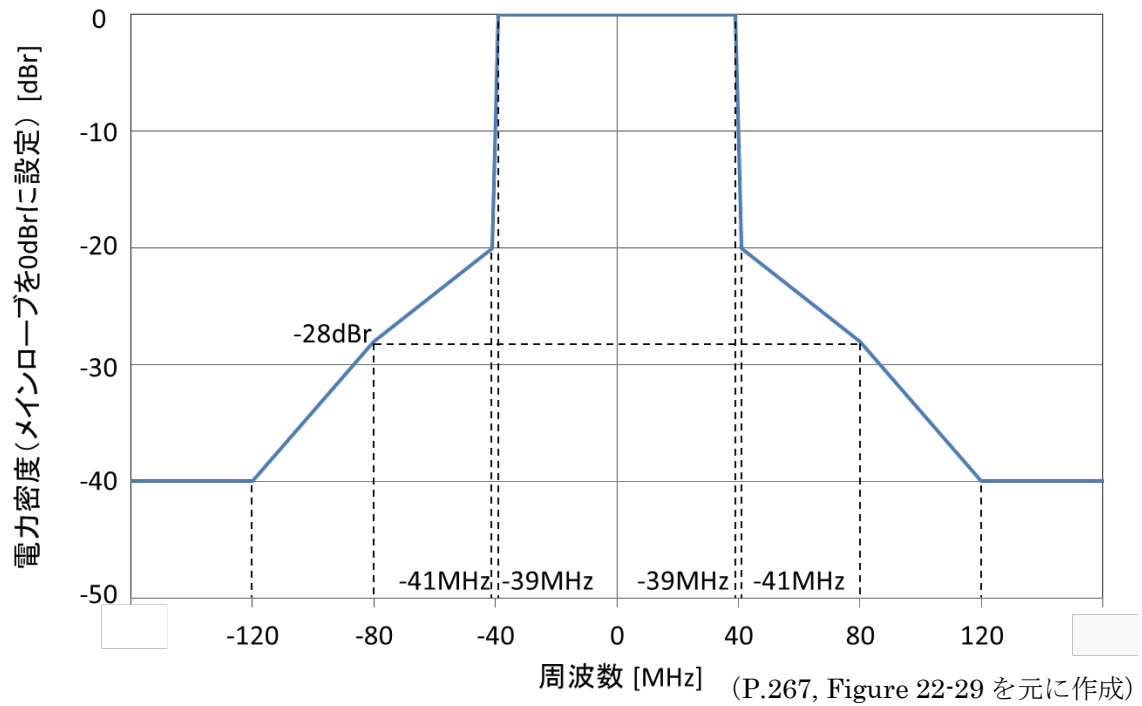
– Support for 160 MHz channel width

– Support for 80+80 MHz channel width

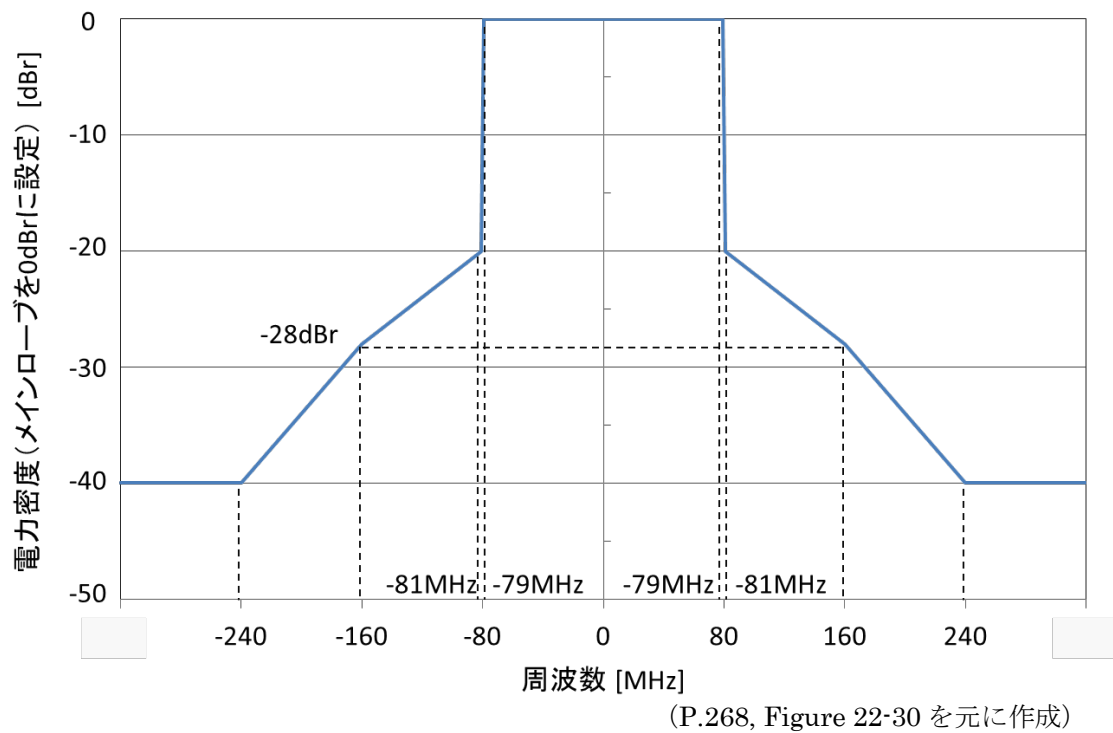
→ VHT STA(11ac 規格をサポートする端末)はオプションとして 160MHz 幅あるいは 80+80MHz 幅の不連続チャネルをサポートしても良い。

# 1 スペクトラムマスクの規定について

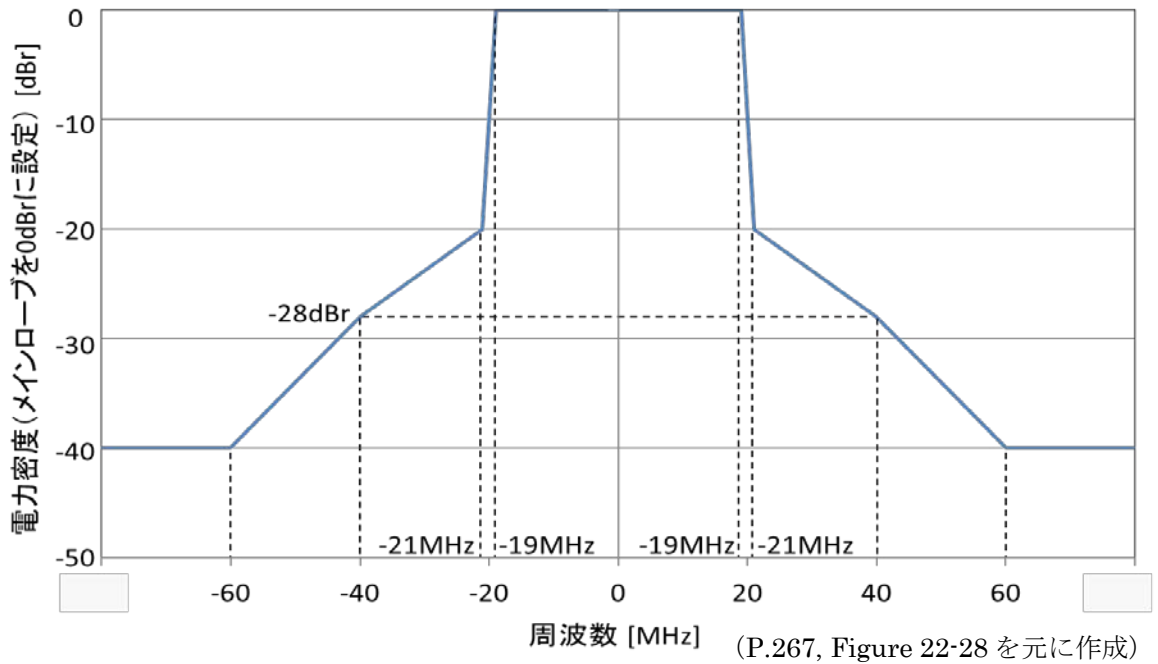
## (1) 80MHz システム



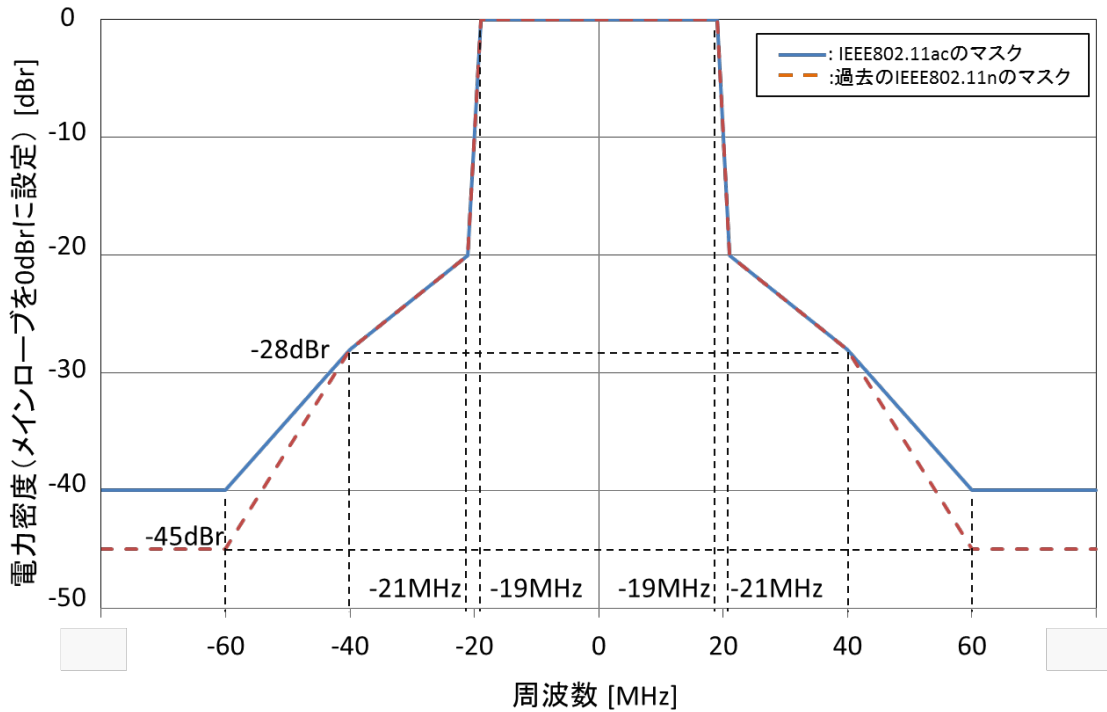
## (2) 160MHz システム



(3) 40MHz システム



(4) 40MHz システム (IEEE802.11ac と IEEE801.11n との比較)



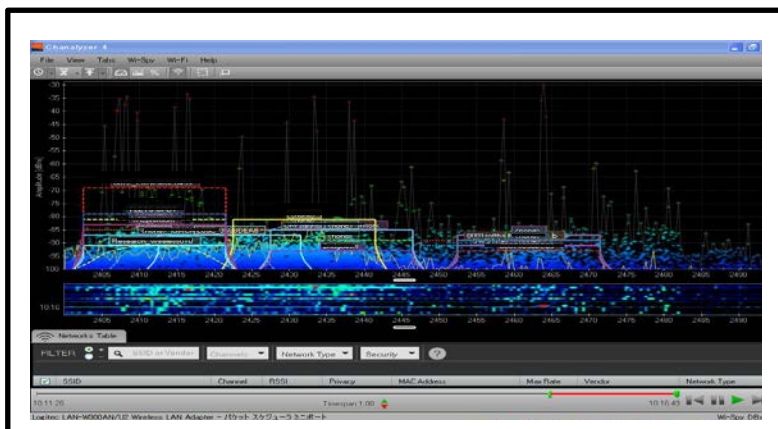
(IEEE 802.11n-2009 p.315, Figure 20-18 を元に作成)

ただし最新版規格では、上記(3)と同様のマスクに変更されている

# 無線 LAN 測定結果

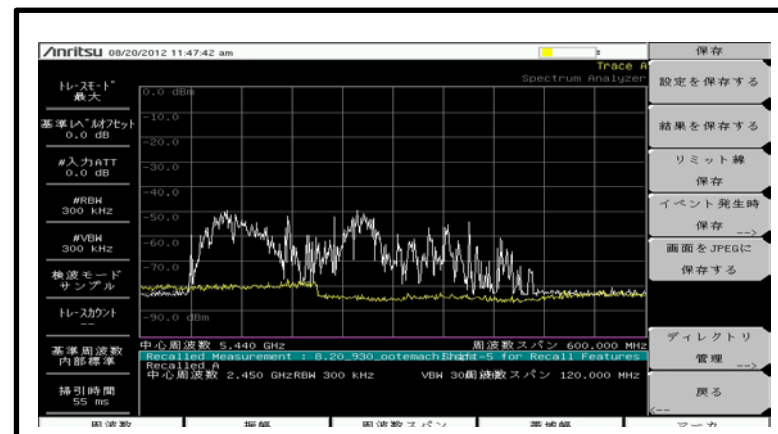
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 調査日時 平成24年8月20日(月) 09時35分頃  
 調査場所 地下鉄 東西線 大手町駅ホーム

Wi-Spyの画面

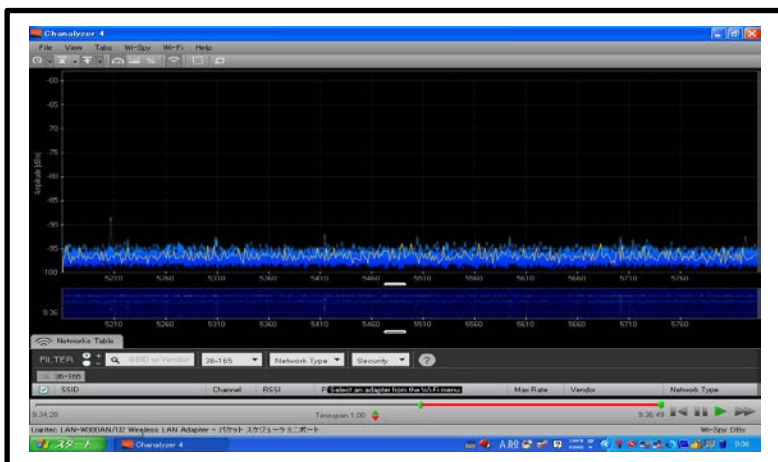


2.4GHz帯

スペクトラムアナライザ測定画面

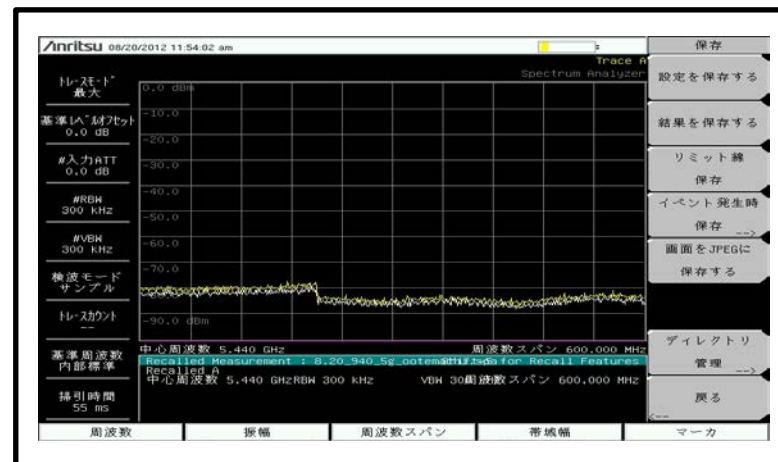


Wi-Spyの画面



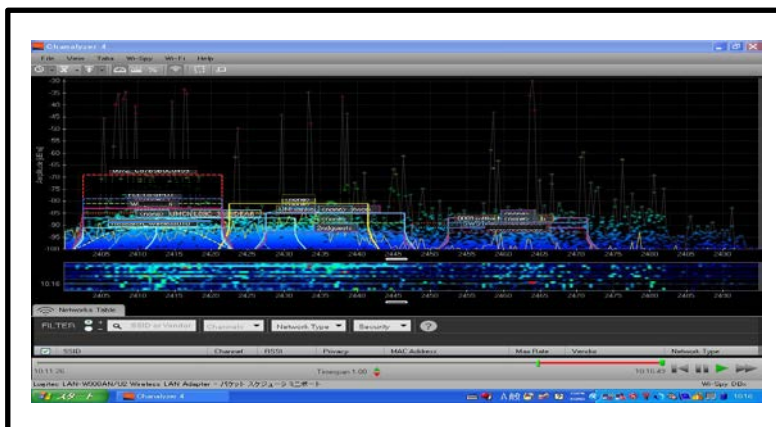
5GHz帯

スペクトラムアナライザ測定画面



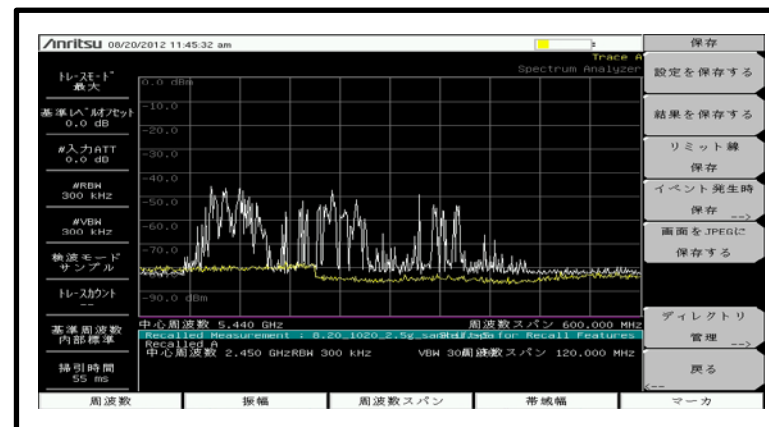
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調査日時 平成24年8月20日(月) 10時20分頃  
調査場所 大手町(サンケイビル前)

Wi-Spyの画面



2.4GHz 帯

スペクトラムアナライザ測定画面

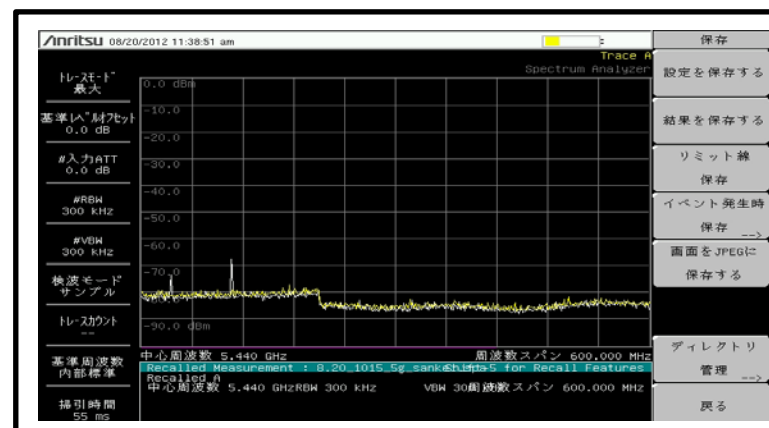


Wi-Spyの画面



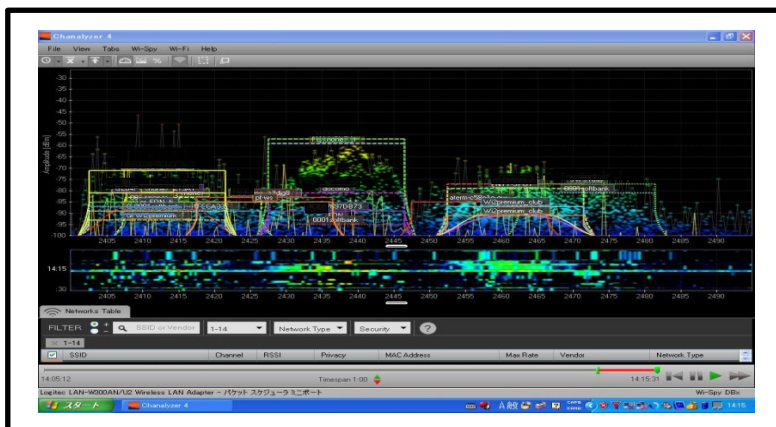
5GHz 帯

スペクトラムアナライザ測定画面



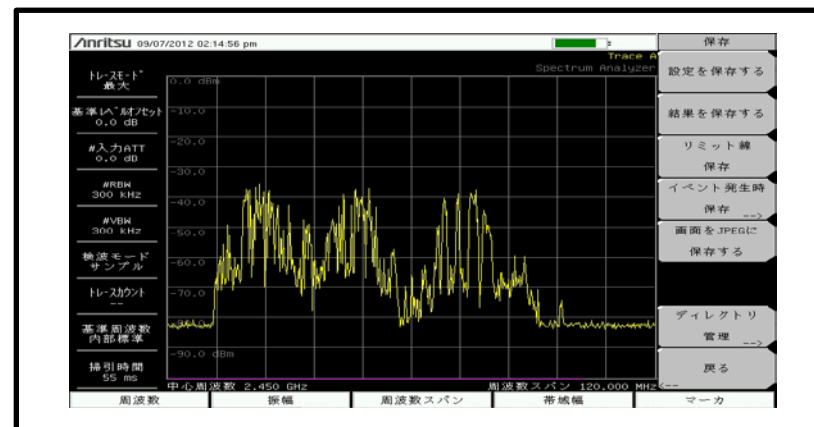
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Wi-Spyの画面

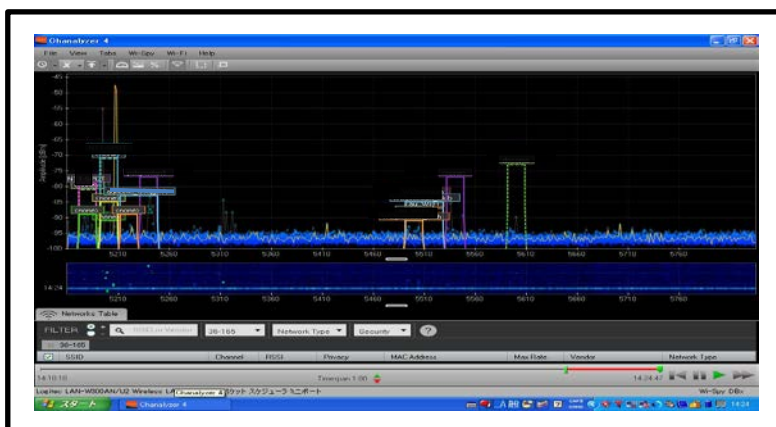


2.4GHz帯

スペクトラムアナライザ測定画面

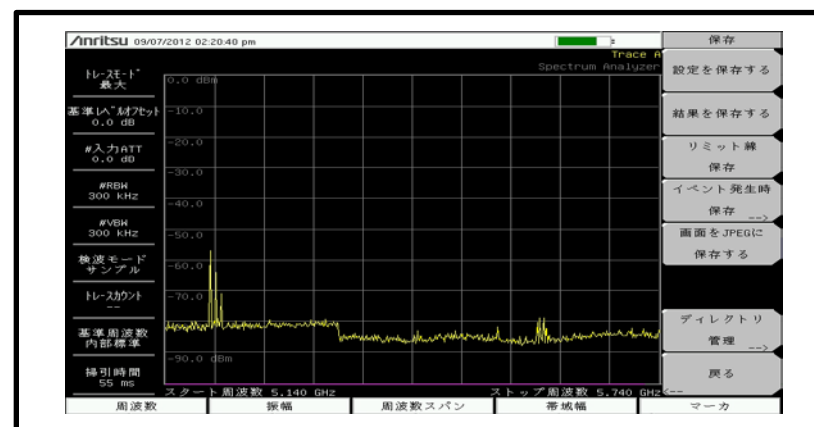


Wi-Spyの画面



5GHz帯

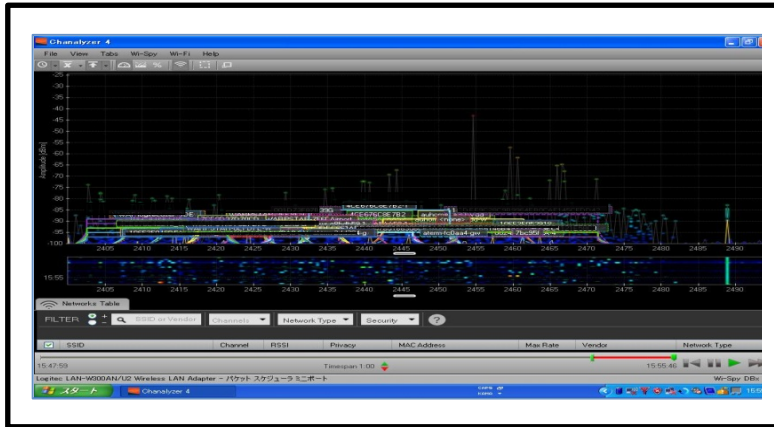
スペクトラムアナライザ測定画面





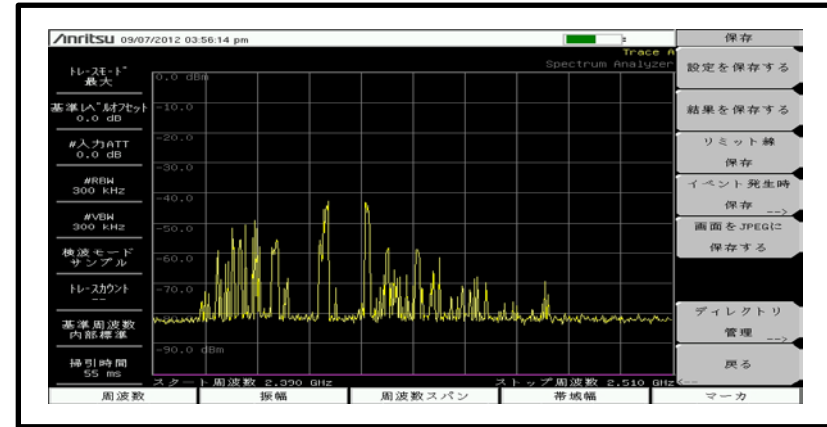
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調査日時 平成24年9月7日(金) 15時55分頃  
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Wi-Spyの画面

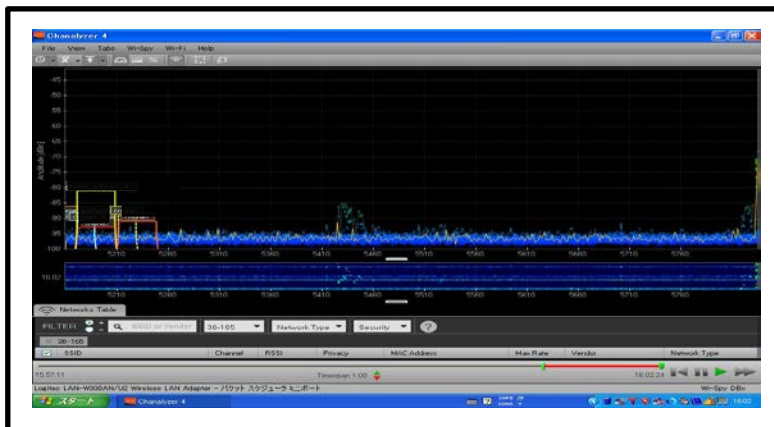


2.4GHz帯

スペクトラムアナライザ測定画面

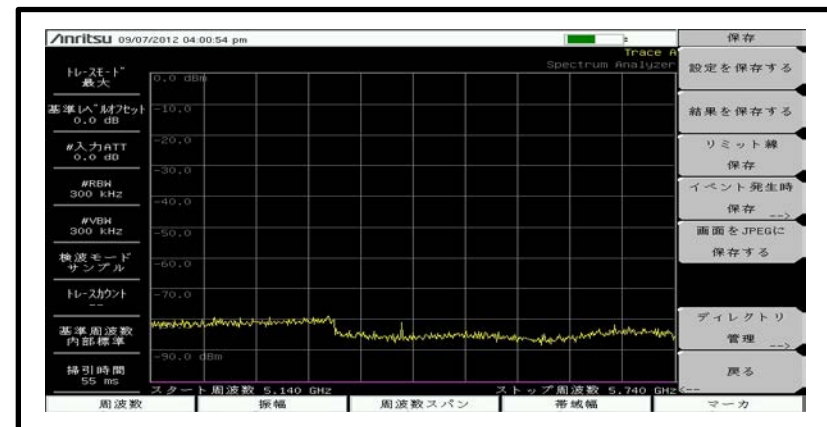


Wi-Spyの画面



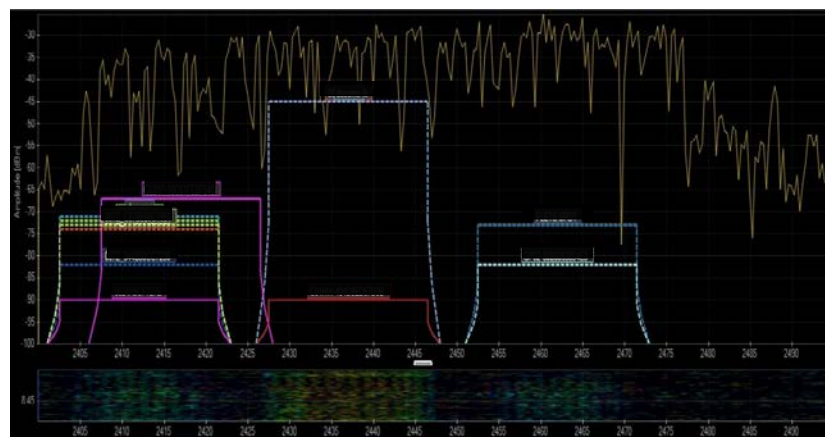
5GHz帯

スペクトラムアナライザ測定画面



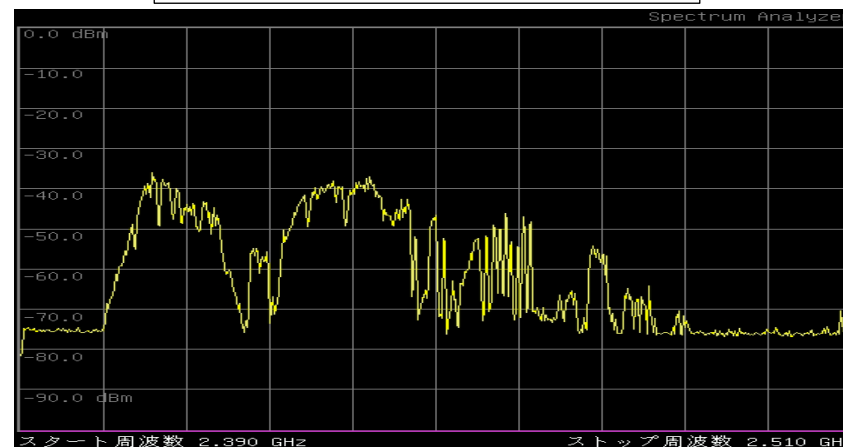
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調査日時 平成24年8月29日(水) 8時30分頃  
調査場所 仙台市青葉区東二番町 仙台市地下鉄広瀬通駅構内

Wi-Spyの画面

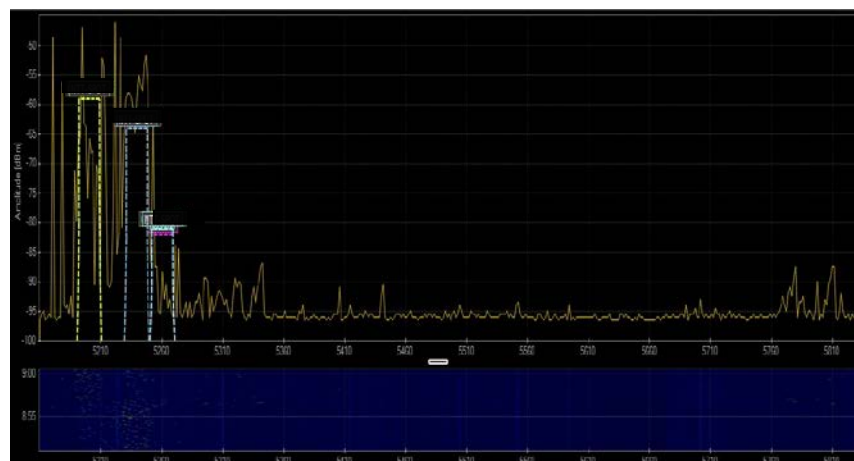


2.4GHz 帯

スペクトラムアナライザ測定画面



Wi-Spyの画面



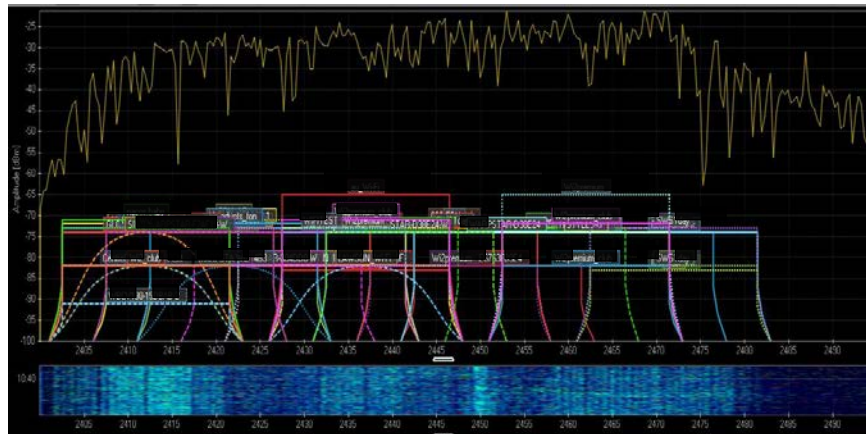
5GHz 帯

スペクトラムアナライザ測定画面



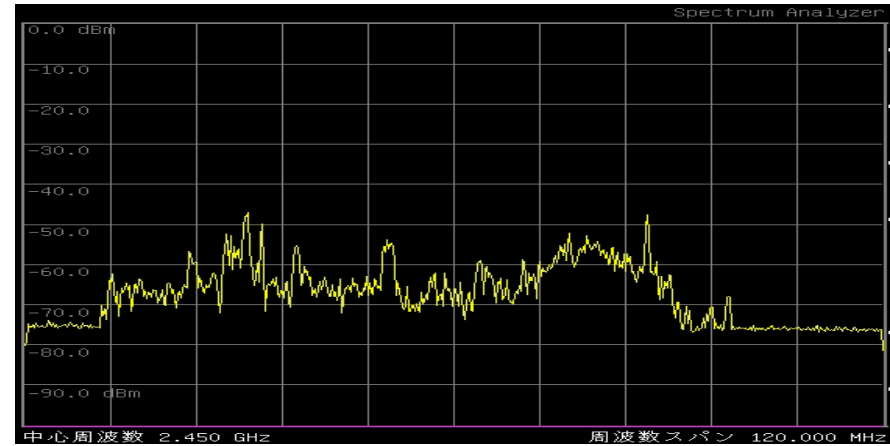
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Wi-Spyの画面

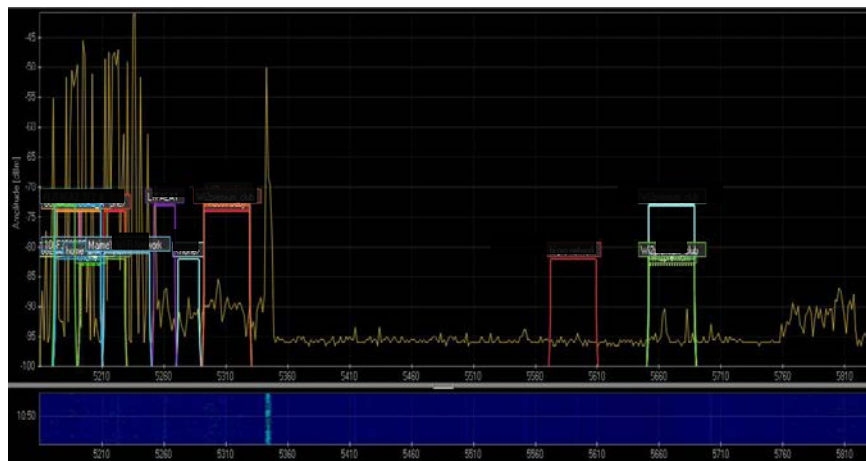


2.4GHz 帯

スペクトラムアナライザ測定画面

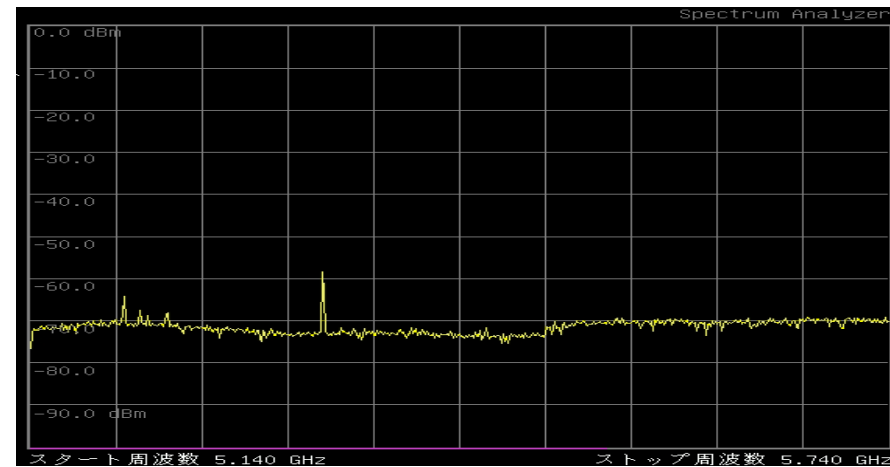


Wi-Spyの画面



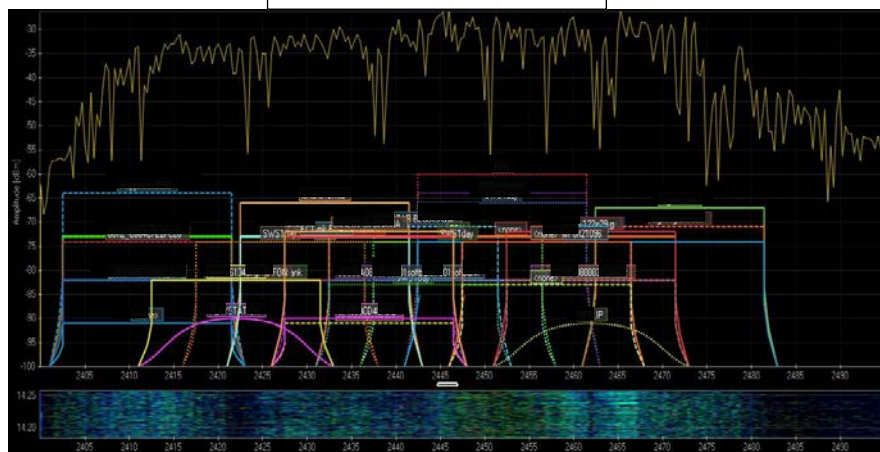
5GHz 帯

スペクトラムアナライザ測定画面



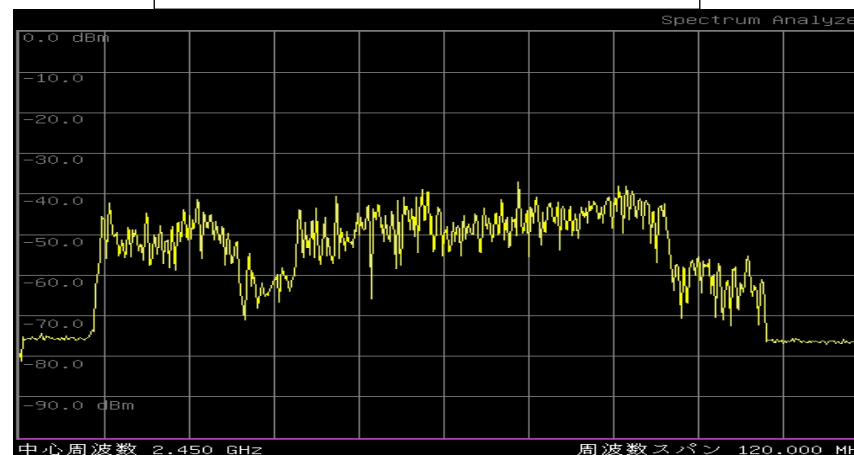
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調査日時 平成24年8月30日(木) 14時30分頃  
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Wi-Spyの画面

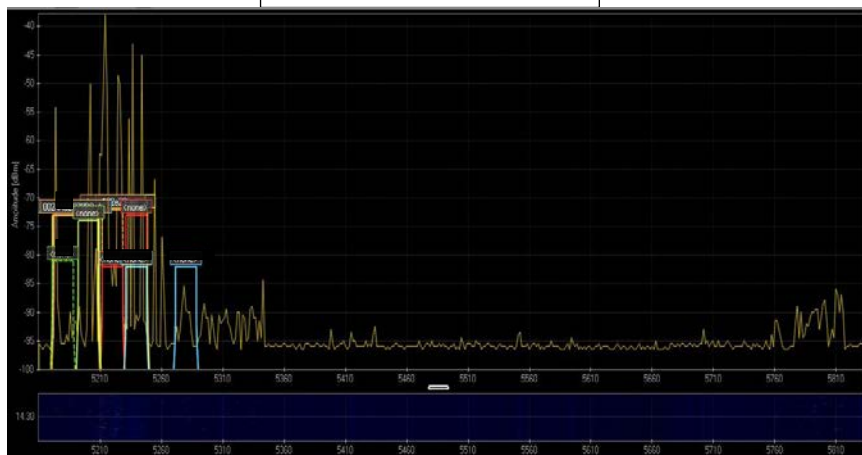


2.4GHz帯

スペクトラムアナライザ測定画面



Wi-Spyの画面



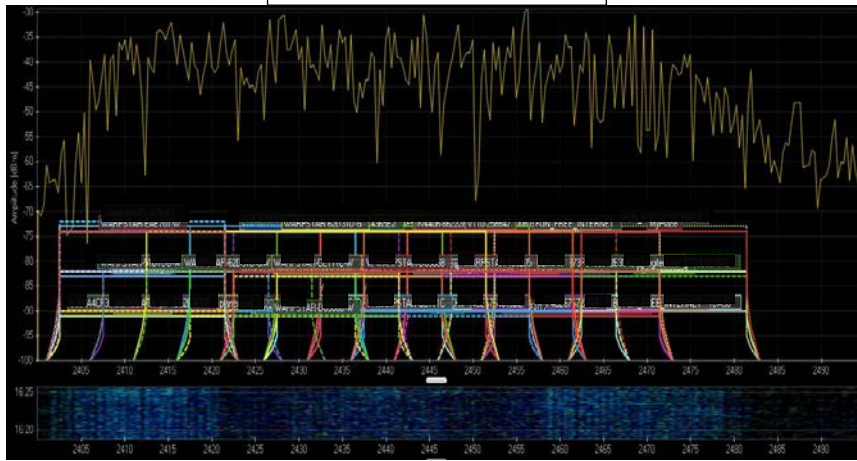
5GHz帯

スペクトラムアナライザ測定画面



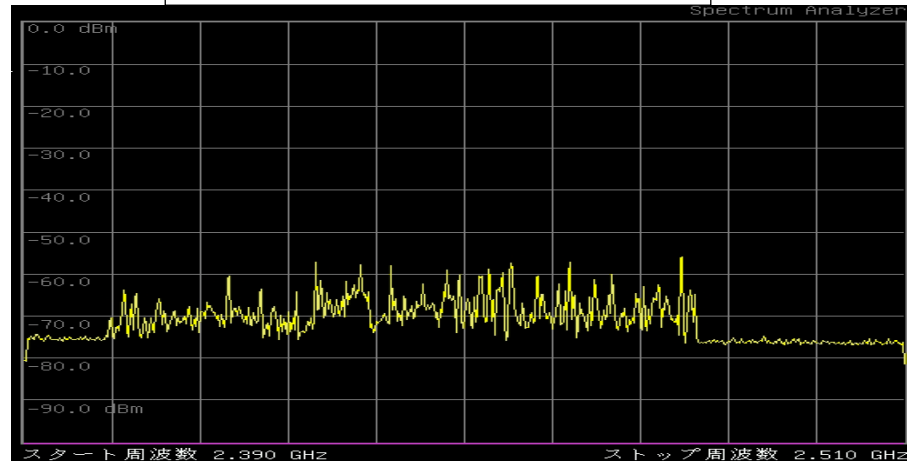
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調査日時 平成24年8月29日(水) 16時30分頃  
調査場所 仙台市太白区茂庭台四丁目 茂庭台団地周辺

Wi-Spyの画面

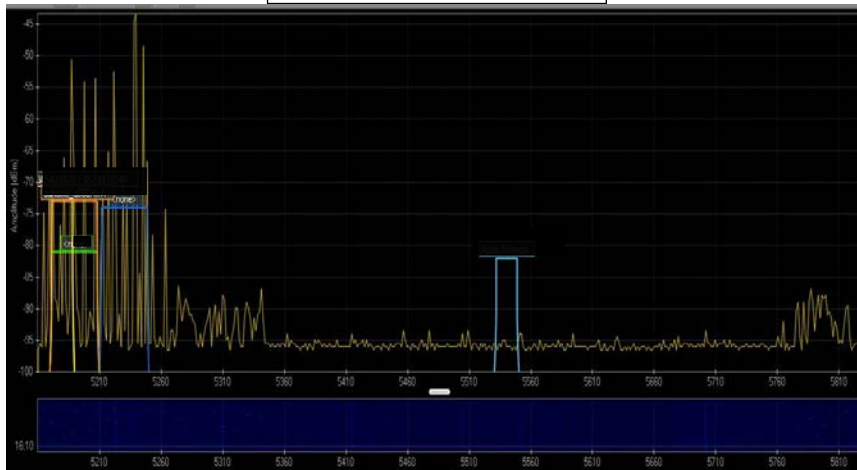


2.4GHz 帯

スペクトラムアナライザ測定画面

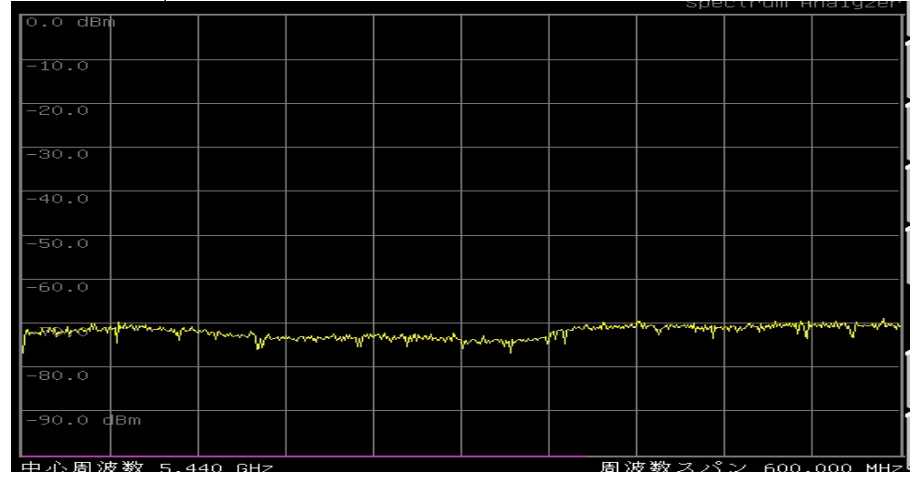


Wi-Spyの画面



5GHz 帯

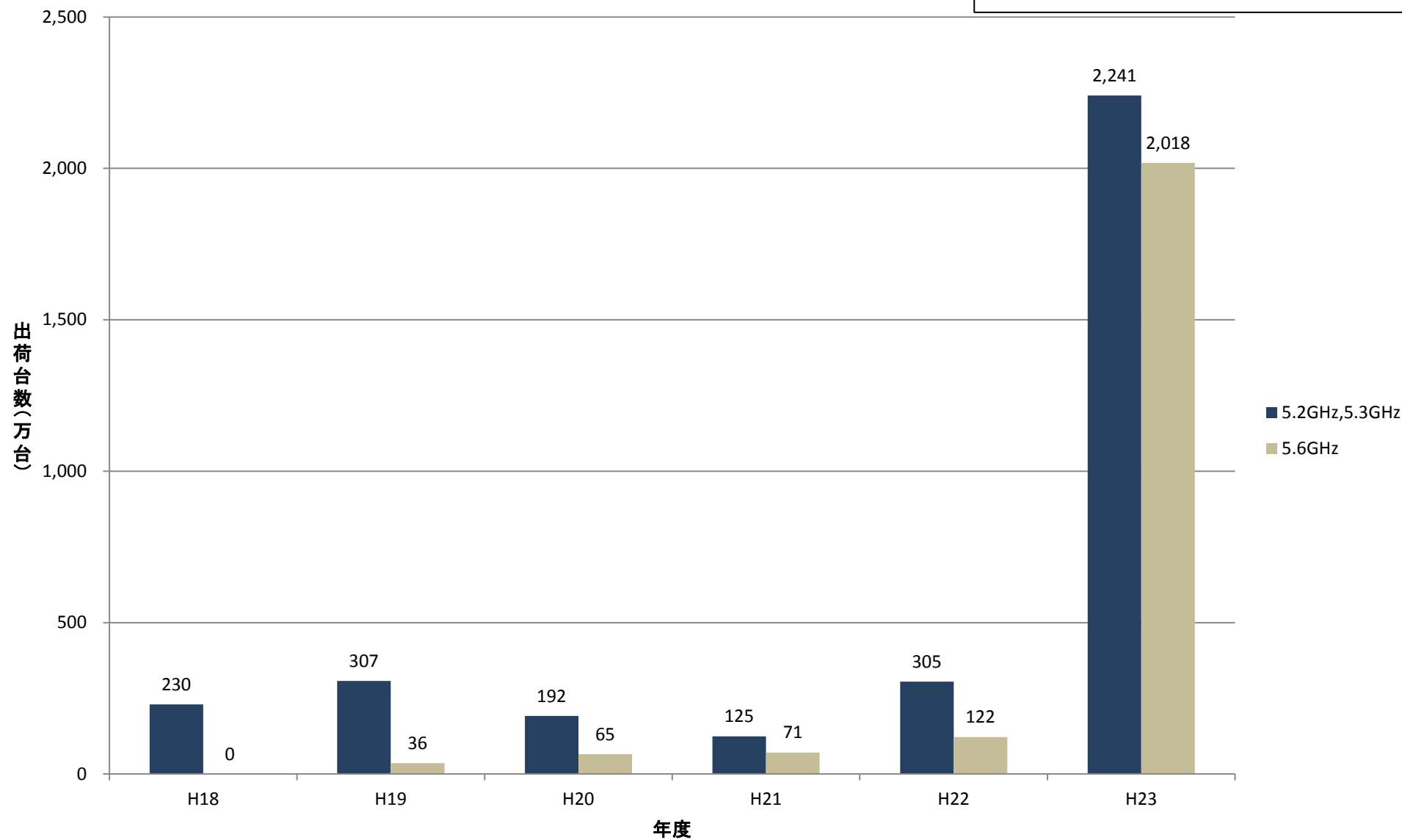
スペクトラムアナライザ測定画面



# 無線 LAN 出荷台数

# 5GHz帯無線LANの出荷台数（総務省調査）

H18～H20の数値（H20年度調査）  
H21～H23の数値（H24年度調査（速報値））



# 実環境における無線 LAN システム間の共用について