RoboCup2017 Wireless LAN Guideline・Rules・Operation (**Draft**)

2017/04/25 Ver.0.3

Guide: Policy and Concept Regarding the Use of Wireless Devices at RoboCup

1. The RoboCup Local Organizing Committee will coordinate the use of radio resources by visitors and competitors so that the competition can be conducted smoothly.

2. The Committee will assign radio frequencies (LAN channels, etc.) to all leagues participating in the competition.

3. Each league should use the assigned frequencies (LAN channels, etc.) to ensure trouble-free operation during the competition.
   - Each league can use the specified frequencies preferentially.
   - Where particular circumstances of a league (competitor) require the use of frequencies other than those assigned, the league's representative should coordinate with the representatives of other leagues.

4. Each league/competitor is not allowed to use radio frequencies in a way that affects the progress of the competition.
   - All activities at the competition must comply with local laws and regulations on wireless use.

5. Any operational failures of the robots that are thought to be caused by radio interference should be resolved by the competitors experiencing the failure.
   - If radio interference is caused by other leagues, the chairs of the relevant leagues and the Committee will assist in resolving the problem, if necessary.

Common Rules for 2.4 GHz and 5 GHz Wireless LANs

- **Generally, it is prohibited to use any radio frequencies other than those assigned to each league.**
  - See the attached table.

- **It is prohibited to use channel bonding (dual channel/wide channel) that uses several channels (40, 80, and 160 MHz-frequency bands) simultaneously.**
  - IEEE 802.11a/b/g/n/ac uses 20 MHz per channel.

- **It is prohibited to use any wireless LAN access point (AP) other than one installed by the Committee.**
  - For Rescue Robot Leagues, each team can use an AP.

- **When an AP is installed and set, the following information should be indicated on the AP.**
  - SSID
    Wireless Standard (e.g. 2.4 GHz/5 GHz, 11ac/a/b/g/n)
    Channel used (1ch, 6ch, etc.)

- **It is recommended to implement at least minimum security such as WEP on the AP.**

Common Rules for Each League

- **It is prohibited to use wireless functions of PCs and peripheral devices that are not used in the competition.**
  - It is prohibited to use wireless mice and keyboards (and other wireless peripheral devices using any frequency).

- **Generally, it is prohibited to use mobile Wi-Fi routers.**
  - It is prohibited to use the tethering function of a smartphone or mobile router.
  - Using a wired connection (e.g. USB connection), however, is allowed.

- **The wireless LAN and Bluetooth functions of all portable devices must be turned off.**
  - The wireless LAN and Bluetooth functions of smartphones, iPhones, tablet PCs, iPad and other devices that are not used in the competition should be turned off.
  - It is prohibited to use Bluetooth headsets with mobile phones, as well as other wireless headphones with music players.

- **It is prohibited to use any type of portable game machine in the venue.**
  - Portable game machines include Nintendo DS series and SONY PSP.
    - It is prohibited to use any portable devices whose wireless on/off status cannot be confirmed externally.
      (* Mobile phones and personal handy phones (PHSs) are allowed.

Rules for 2.4 GHz Devices

- **For the 2.4 GHz band, only the following standards are allowed.**
  - Major: Wireless LAN (IEEE 802.11b/g/n/ac)
    - * It is recommended to unify the standard (to 11b/g/n/ac) within each league.
      Using several standards simultaneously decreases the communication speed.
    - Wireless devices must be able to set the frequency to be used and select from among the 14 channels for wireless LANs.
    - Only Small Size Soccer Leagues can use ZigBee (IEEE 802.15.4).
  - Junior: Bluetooth (IEEE 802.15.1)
    - For radio output, only Class 2 (2.5 mW) and Class 3 (1 mW) are allowed.
      - Class 1 (100 mW) devices cannot be used.

- **For wireless LAN channels, channels 1, 5, 9 and 13/14 can be used.**
  - In principle, it is better to use channels 1, 6 and 11. However, since the number of leagues has increased, all of the above four channels will be used.
    Since areas of approximately 1 MHz of each channel overlap the neighboring channels, communication speed is slightly reduced.

- **It is prohibited to use wireless LAN devices that cannot set the frequencies.**
  - APs that dynamically change frequencies (by frequency hopping) are not allowed.

- **Generally, it is prohibited to use wireless devices with proprietary standards, such as:**
  - Wireless game controllers
  - Video transmitters (video transfer equipment)
  - Radio-control transmitters using the 2.4 GHz band

Rules for Bluetooth (2.4 GHz)

- **Junior Leagues can use Bluetooth devices under the following conditions:**
  - Standard: Version 1.2 or later
  - Output: Class 2 (2.5 mW) or Class 3 (1 mW)
    - Class 1 (100 mW) devices are not allowed.
  - If it is confirmed that a Bluetooth device affects the devices used by Senior Leagues, its use should be immediately stopped.
  - Senior Leagues are not allowed to use Bluetooth devices.

Class	Output	Use
Class 1	100 mW	×
Class 2	2.5 mW	○
Class 3	1 mW	◎

Version (Standard)	Use
1.0b	×
1.0b+CE	×
1.2	△
2.0 (2.0+EDR) or later	◎

Rules for Radio Control

- **Generally, it is prohibited to use a radio-control transmitter in competition.**

- **26 MHz, 40 MHz, and 72 MHz for radio control**
  - When using the above frequencies, approval should be acquired from the Committee in advance (concerning permitted frequencies and bands).
  - Measures for changing frequencies should be provided.
    - Preparing several crystal oscillators, etc.

- **Radio-control transmitters using the 2.4 GHz band are not allowed.**
  - It is prohibited to use radio-control transmitters using the 2.4 GHz band from any manufacturer.

  * Since the frequency characteristics of these devices are not standardized, whether each device causes interference has currently not been confirmed.

Other Rules (for Exhibitions by Companies)

- **Generally, it is prohibited for company exhibitors to use wireless.**
  - Only the 5 GHz band can be used in TEVA OCEAN ARENA.

- **Food exhibitors**
  - Food exhibitors cannot use microwave ovens, wireless POS devices (e.g. cash registers, bar code readers).

Free WiFi (Plan)

- Event Hall : 2nd floor

議論済みで,
確定しているのであれば追記お
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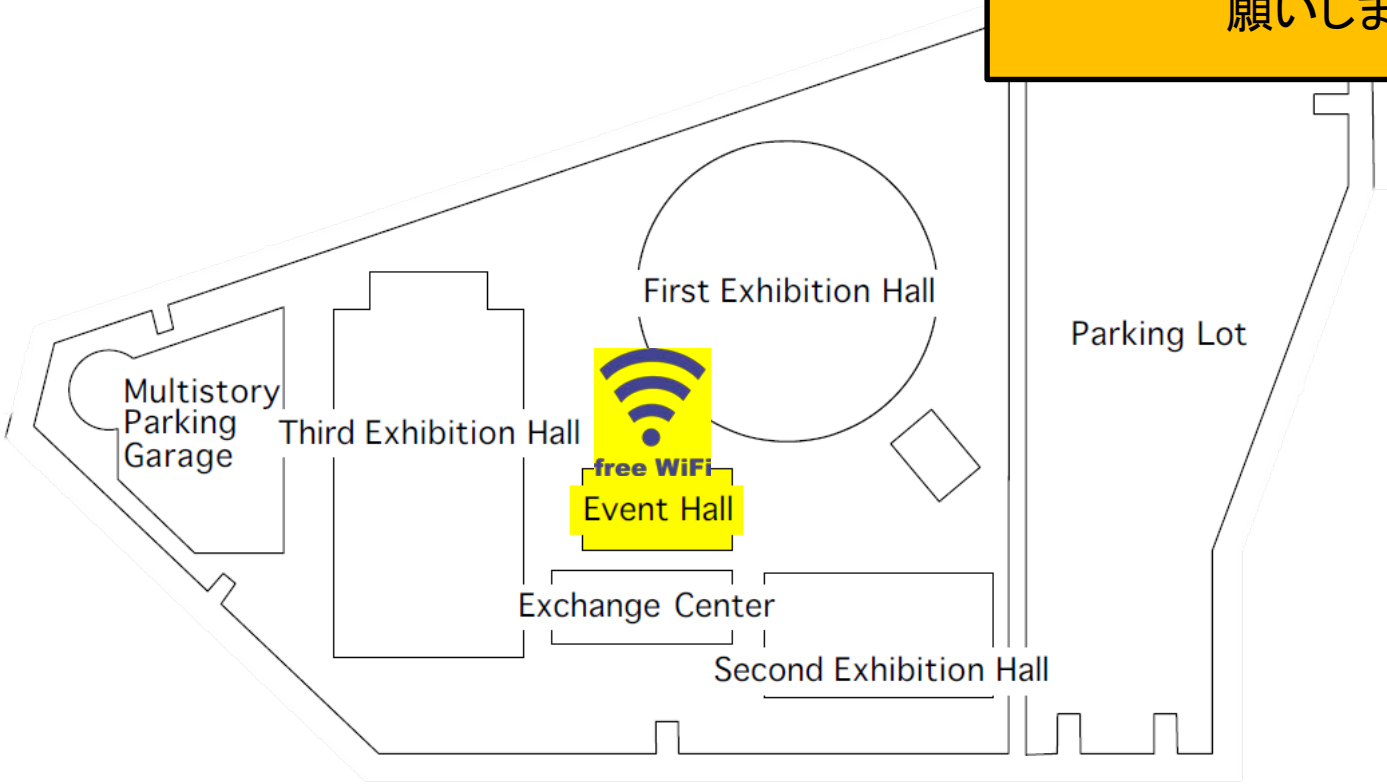
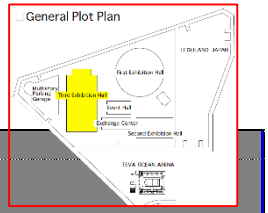


Operation: Assignment of Preferred Wireless LAN Channels (Proposed)

Hall	League	2.4 GHz	5 GHz	SSIDs (Example)
Third Exhibition Hall	Humanoid Soccer League	1ch	52ch / 56ch	hsl_1ch_ hsl_52ch_
	Standard Platform League (NAO League)	5ch	60ch / 64ch	spl_5 ch spl_60ch
	Medium Size Soccer League	----	36ch 52ch / 56ch	mssl_36ch mssl_52ch
	Small Size Soccer League	13ch / 14ch / ZigBee	48ch	sssl_13ch sssl_48ch
	Industrial (@Work)	9ch	100ch / 104ch	Work_9ch_*** Work_100ch_***
	Industrial (Logistics)	----	48ch 100ch / 104ch	Logi_48ch_*** Logi_100ch_***
	@Home League	----	36ch 108ch / 112ch	home_36ch home_108ch
	@Home Pepper	----	40ch 108ch / 112ch	Pepper_40ch Pepper_108ch
	@Home HSR	----	44ch 116ch / 120ch	HSR_44ch HSR_124ch
	APC (Amazon Picking Challenge)	----	124ch / 128ch	APC_124ch_***
	Company Exhibition Booth	----	----	----
TEVA OCEAN ARENA	Rescue Robot League	----	36 / 40 / 44 / 48ch 52 / 56 / 60 / 64ch	rrl_48ch_***
	Junior Rescue	(Bluetooth)	----	-
Event Hall	Simulation League (Soccer / Rescue)	FreeWiFi	----	-
TEVA OCEAN ARENA	Junior Soccer	(Bluetooth)	----	-
	Company Exhibition Booth	----	36 / 40 / 44 / 48c	-

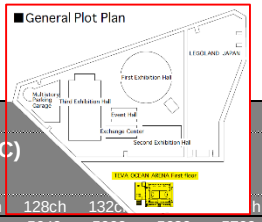
Third Exhibition Hall



League / Category		Wireless (WiFi) Priority chnnel																							
		2.4[GHz]				5.2[GHz] (W52 / UNII1)				5.3[GHz] (DFS&TPC) (W53 / UNII2A)				5.6[GHz] (DFS&TPC) (W56 / UNII2C)											
		1ch	5ch	9ch	13ch	36ch	40ch	44ch	48ch	52ch	56ch	60ch	64ch	100ch	104ch	108ch	112ch	116ch	120ch	124ch	128ch	132ch	136ch	140ch
		2412	2432	2452	2472	5180	5200	5220	5240	5260	5280	5300	5320	5500	5520	5540	5560	5580	5600	5620	5640	5660	5680	5700
Soccer	Humanoid League	1ch								52	56													
	Standard Platform League		6ch									60	64											
	Middle Size League					36ch				52	56													
	Small Size League				13ch 14ch				48ch															
Industrial	Logistics League			9ch										100	104									
	@Work								48ch					100	104									
@Home	@Home League					36ch										108	112							
	@Home League						40ch									108	112							
	@Home League							44ch										116	120					
Amazon Picking Challenge																				124	128			
Robot Exhibition		Do not use																						

52 - 64ch(W53), 100 - 140ch(W56)
DFS (Dynamic Frequency Selection)
TPC (Transmit Power Control)

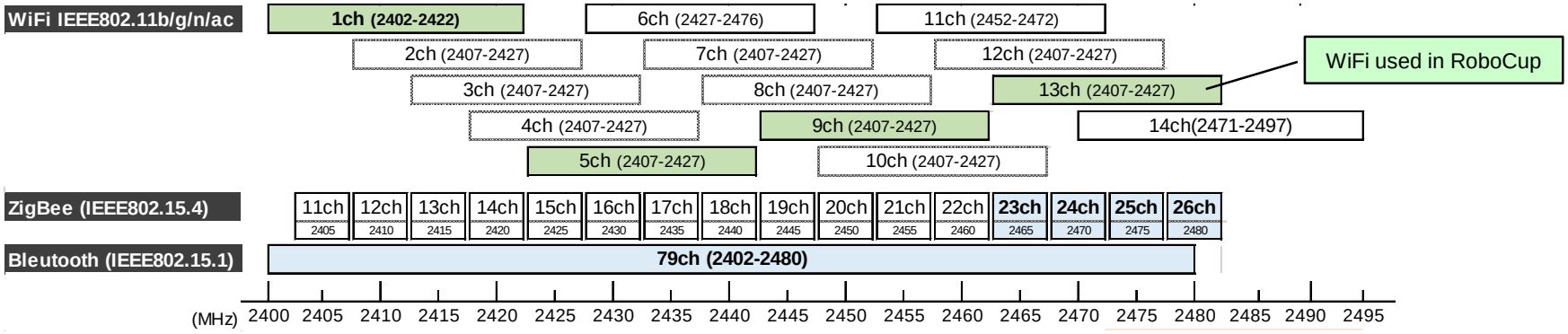
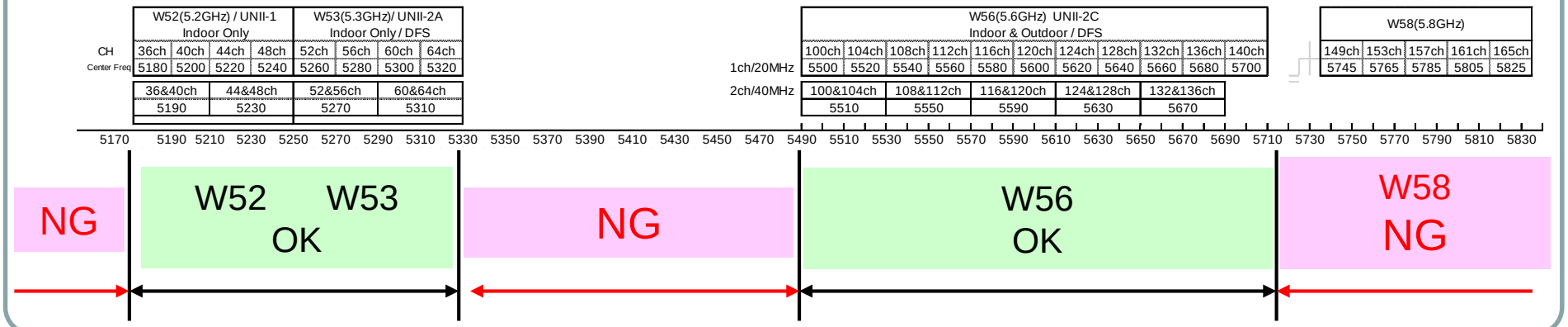
Teva Ocean Arena



League / Category		abbr.	Wireless (WiFi) Priority chnnel																						
			2.4[GHz]				5.2[GHz] (W52/UNII1)				5.3[GHz] (DFS&TPC) (W53/UNII2)				5.6[GHz] (DFS&TPC) (UNII3)											
			1ch	5ch	9ch	13ch	36ch	40ch	44ch	48ch	52ch	56ch	60ch	64ch	100ch	104ch	108ch	112ch	116ch	120ch	124ch	128ch	132ch	136ch	140ch
										5240	5260	5280	5300	5320	5500	5520	5540	5560	5580	5600	5620	5640	5660	5680	5700
Rescue	Rescue Robot League	RRL	Do not use				36ch	40ch	44ch	48ch	52ch	56ch	60ch	64ch											
	Junior Rescue	JR	Do not use																						
	Junior Rescue-CoSpace	JRC	Do not use																						

Reference: Wireless LAN Frequencies Allowed for Use in Japan

- **2.4 GHz band** (IEEE802.11b/g/n, IEEE802.15.1, IEEE802.15.2)
  - 2483.5～2497[MHz] (1ch～14ch)



- **5 GHz band** (IEEE802.11a/n/ac)
  - 5170～5250[MHz] (W52, U-NII-1 : 36ch～48ch)
  - 5250～5330[MHz] (W53, U-NII-2A : 52ch～64ch)
  - 5490～5710[MHz] (W56, U-NII-2C : 100ch～140ch)