RF Exposure Justification
in co-locating with other transmitters

1. RF Exposure evaluation for the applying modular transmitter

The separation distances between human body and WLAN transmission antennas of the specific host PC devices are shown in the Section 5 or Section 6 of separate "WLAN_Antenna_Iinfo" exhibits.

The all transmission antennas maintain the separation distance with at least 202mm. Therefore the applying WLAN transmitter module (**FCC ID: PD9LEN4965AGN, IC: 1000M-L4965AGN**) and the antenna systems are subjected to "Mobile device" pursuant to FCC CFR 47 Section 2.1091, or "RF Exposure Evaluation" category pursuant to IC RSS-102e clause 2.5.2.

[EIRP & MPE Evaluation]

The following table shows the highest conducted peak output power values of the applying modular transmitter device, and the maximum peak antenna gains of the new host device.

Transmission mode	**P**: conducted peak output power	**G**: peak antenna gain *1
2.4GHz band	0.318 W (25.0 dBm)	1.93 dBi
5.2GHz band	0.068 W (18.3 dBm)	2.89 dBi
5.8GHz band	0.100 W (20.0 dBm)	2.86 dBi

*1: See Annex-1 in more detai.

Thus, EIRP and the maximum power density at 20cm distance are calculated as follows.

Transmission mode	EIRP = P + G (dBm)	EIRP (mW)	MPE Max. power density $S = EIRP/(4 \times \pi \times 20^2)$
2.4GHz band	26.93	493.2	0.0982 mW/ cm^2
5.2GHz band	21.19	131.5	0.0262 mW/ cm^2
5.8GHz band	22.86	193.2	0.0385 mW/ cm^2

With those results, the applying modular transmitter has found to comply with the FCC MPE limit (1.0 mW/cm^2) according to FCC CFR 47 section 2.1091 for general Population/Uncontrolled exposure.

Also the applying modular transmitter has found to comply with the IC "RF Exposure Evaluation", EIRP limit (5W) according to IC RSS-102e clause 2.5.2.

2. RF Exposure evaluation with co-located WWAN transmitter

As shown in the separate "WLAN_Antenna_Iinfo" exhibits, some applying host PC devices incorporate WWAN transmitter.

The WWAN Tx/Rx antennas and the WLAN antennas are co-located with **47mm** of separation distance or less. However both transmitter modules do not establish the network link connections simultaneously, but switch the operation each other within 11 seconds of hand over time when one is in active. (See Section 5 in this exhibit.)

Therefore, any RF Exposure evaluation for the applying WLAN transmitter in co-locating with WWAN transmitters is not required.

3. RF Exposure evaluation with co-located Bluetooth transmitter

Also, the applying host PC devices incorporate the following Bluetooth transmitter, as shown in the separate "WLAN_Antenna_Iinfo" exhibits.

Co-located Bluetooth device

Model Name	FCC ID, IC Cert. Number	Grantee Name	Granted Date	Conducted Tx power	Antenna gain	EIRP
J07H081	FCC ID: MCLJ07H081	HON HAI Precision Ind. Co., Ltd.	June/ 23 / 2005	3 mW	2 dBi (Peak)	4.8 mW
	IC: 2878D-J07H081		Sep. / 02/ 2005			

The four Bluetooth antennas of the applying host PC devices are regarded as "co-located" due to the antenna separation distance from the WLAN antennas, and the WLAN and Bluetooth devices transmit RF frequencies simultaneously.

Host PC model	WLAN-Bluetooth antenna separation distance	
ThinkPad T61 Series 14.1-inch	178mm	**co-located**
ThinkPad T61/R61 Series 14.1-inch windscreen	185mm	
ThinkPad T61 Series 15.4-inch windscreen	186mm	
ThinkPad R61 Series 15.4-inch windscreen	183mm	
ThinkPad R61 Series 15.0-inch	205mm	non co-located
ThinkPad X61 Series 12.1-inch	250mm	

The all Bluetooth antennas are assembled at the hinge section of each applying host PC device, and the separation distance from human body is 33mm or less. Therefore the Bluetooth transmitter module (J07H081) and the antenna systems are generally subjected to SAR evaluation.

However the Bluetooth device is exempted from SAR testing because of 3mW of its low power pursuant to the footnote 14 of the Section 3 in Supplement C to the FCC OET Bulletin 65 or IC RSS-102e clause 2.5.1.

4. RF Exposure evaluation with co-located UWB transmitter (US only)

One of the applying host PC devices (T61 15.4-inch widescreen) incorporates the following UWB transmitter, and the WLAN and UWB devices transmit RF frequencies simultaneously.

Co-located UWB device

Model Name	FCC ID	Grantee Name	Granted Date	MPE
T60H990	FCC ID: MCLT60H990	HON HAI Precision Ind. Co., Ltd.	Under FCC certification process	0.0123 mW/ cm^2 *1

*1: See page 16 of "(Reference) UWB Test Report.pdf".

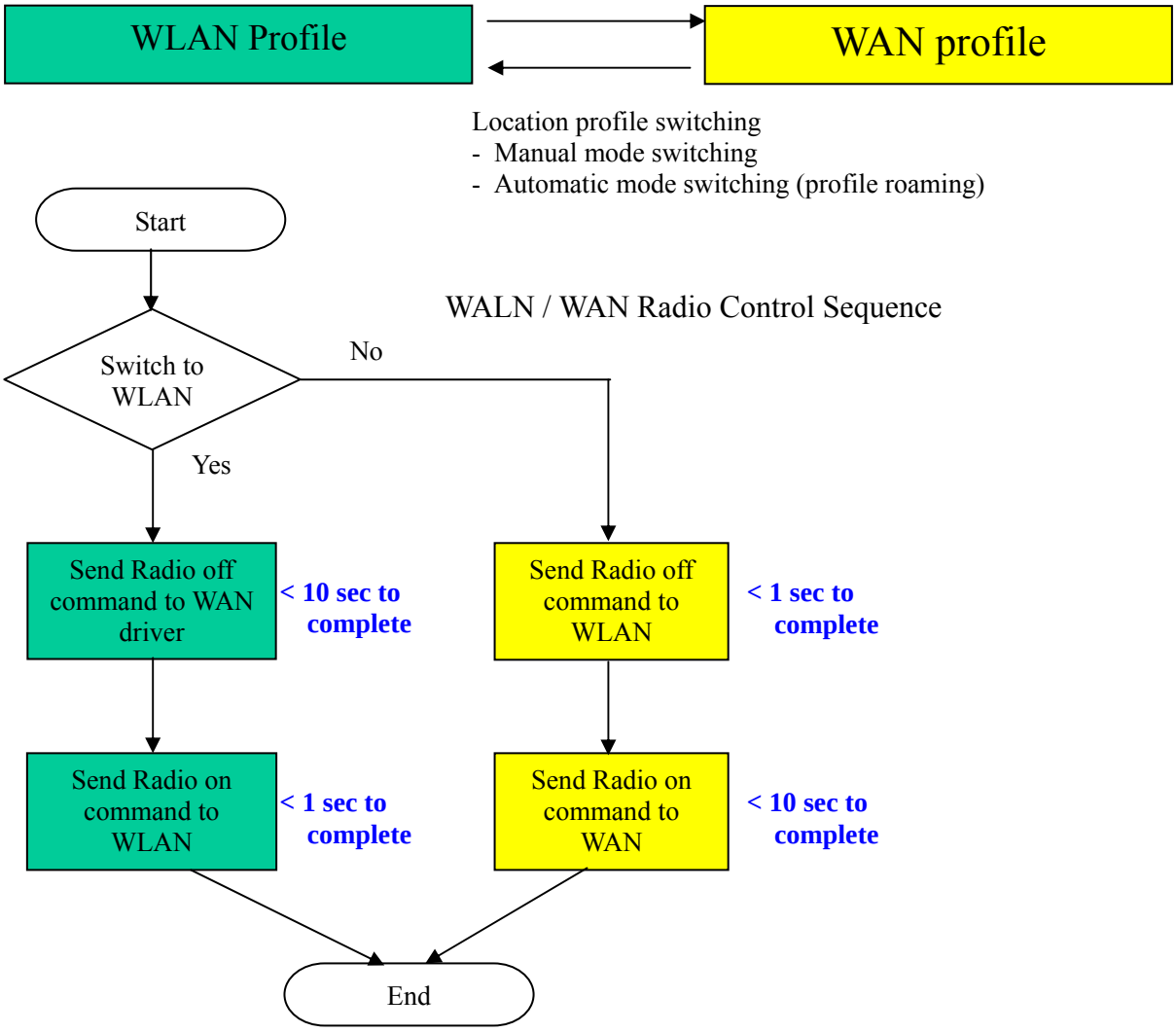
The UWB antenna is located at the top of LCD screen of the host PC and the separation distance from human body is 279mm. Therefore the UWB transmitter (FCC ID: MCLT60H990) and the antenna system are classified as "Mobile device" pursuant to FCC CFR 47 Section 2.1091.

The sum of MPE value of the applying WLAN transmitter and the UWB device is 0.1105 mW/ cm^2, so those devices have found to comply with the FCC MPE limit (1.0 mW/cm^2) according to FCC CFR 47 section 2.1091 for general Population/Uncontrolled exposure, then those devices are allowed to transmit RF frequencies simultaneously.

5. Wireless LAN /WAN switching scheme within 11 seconds of handover time

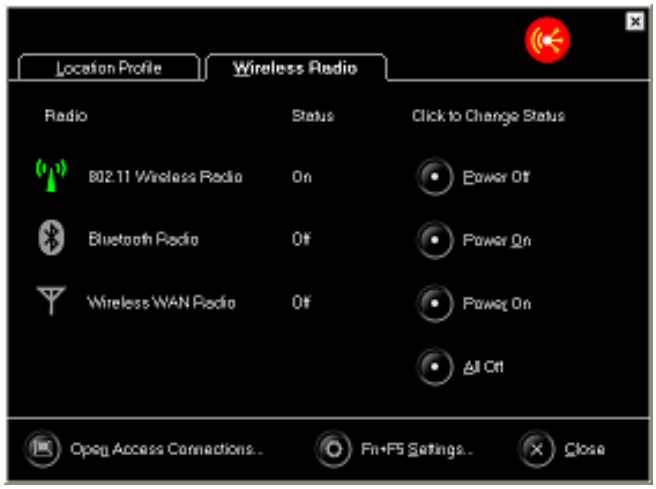
Location profile switching scenario

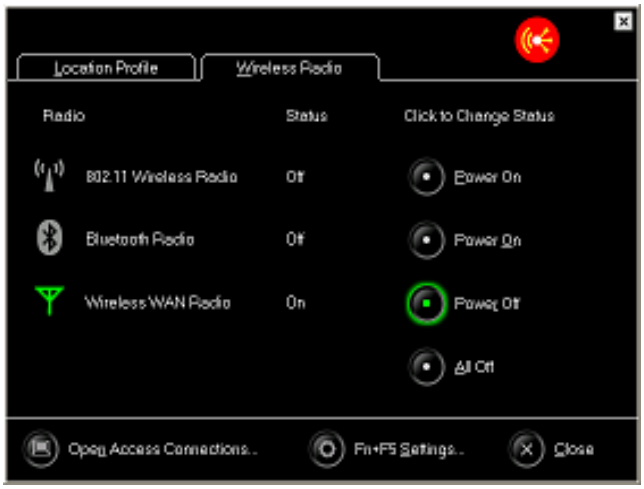
- Exclusive control for WLAN and WAN when WLAN and WAN location profile is applied by user (manual mode switching)
- Exclusive control when automatic location switching is performed by Access Connections (automatic profile roaming)

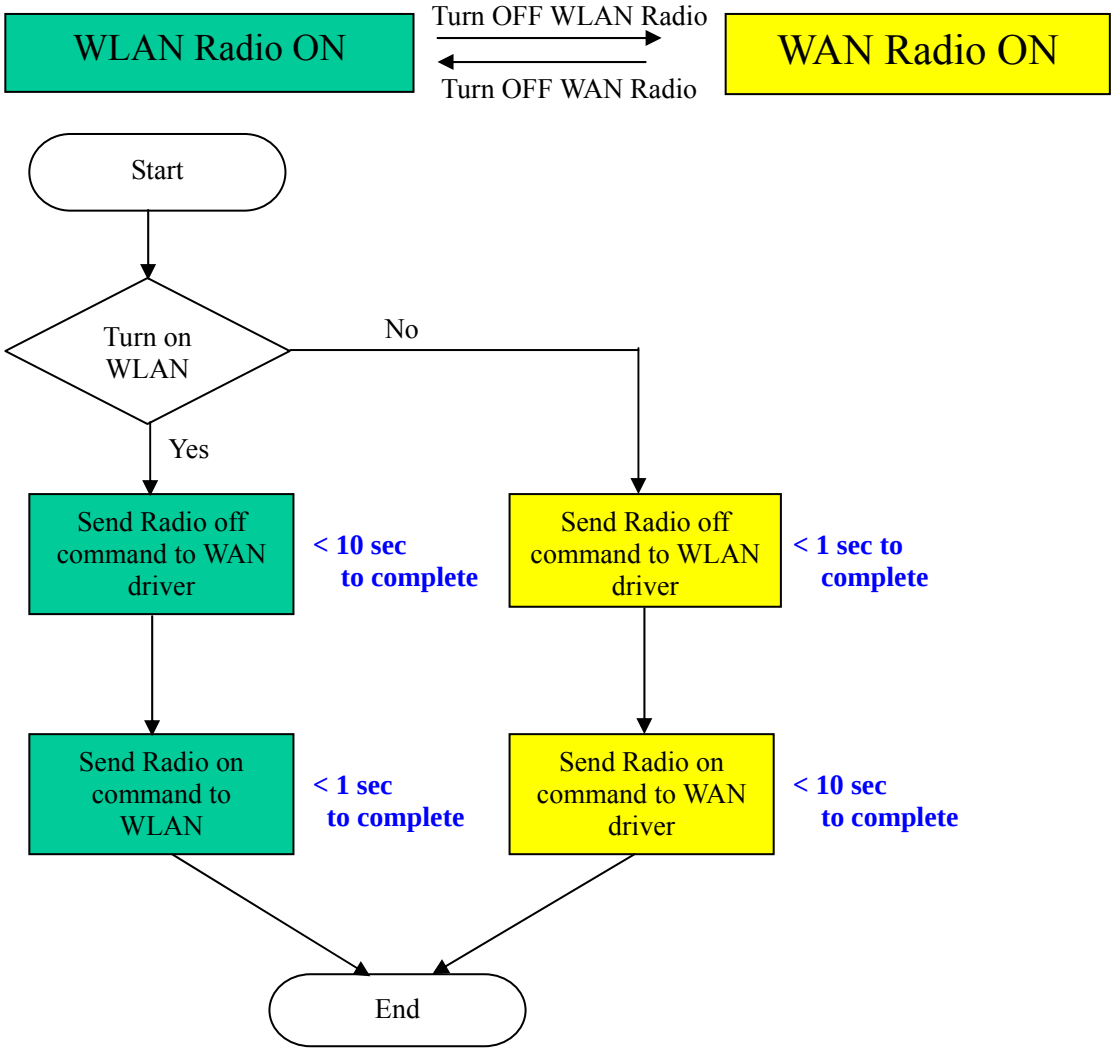


Radio control by software menu (Fn+F5 hot key)

Exclusive control when WLAN or WAN Radio ON is selected by hot key



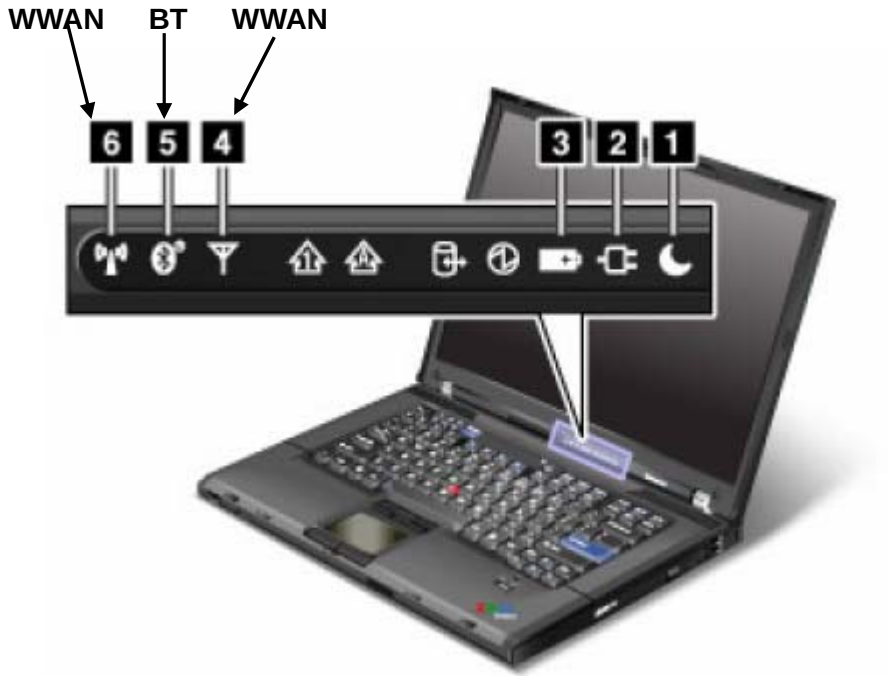




Wireless WAN/LAN status indication

The sifting status from WAN(LAN) to LAN(WAN) is also indicated with the following LED. The switching time is actually shorter than 11 seconds of logical control limit time.

1.



Annex-1 Antenna Gain List

				Main Antenna					Auxiliary Antenna				
						Frequency band (GHz)					Frequency band (GHz)		
	LCD	Antenna Manufacturer	Antenna type	Antenna P/N	Cable length	2.4 -2.5	5.15 -5.35	5.725 -5.85	Antenna P/N	Cable length	2.4 -2.5	5.15 -5.35	5.725 -5.85
T61/T61p	15.4" wide	FOXCONN	PIFA	WDAN-L1CR3001-DF	504mm	-1.00	1.51	1.86	WDAN-L1CR3003-DF	529mm	0.95	0.39	0.93
		Galtronics		50-52-05	376mm	-1.88	2.77	2.42	50-66-03	484mm	-0.68	-0.34	0.17
T61 / T61p	14.1"	Hitachi	PIFA	HMT12-MAIN	415mm	-0.13	2.12	2.83	HMT12-AUX	602mm	1.58	2.66	2.41
		FOXCONN		WDAN-L1DV3001-DF	415mm	-0.76	2.08	0.46	WDAN-L1DV3003-DF	602mm	0.00	-0.41	0.07
		Galtronics		50-52-03	415mm	0.02	2.56	0.73	50-54-03	602mm	0.26	1.42	0.43
R61	15.0"	Hitachi	PIFA	HFT47	550mm	-1.04	2.36	1.23	HFT48	435mm	1.83	2.14	1.46
		Tyco		1770417-1	535mm	1.18	1.30	2.42	1770418-1	435mm	-1.35	0.69	0.83
		Wistron NeWeb		81.EEF15.003	580mm	1.10	2.34	2.70	81.EEF15.004	470mm	1.50	2.10	2.40
T61 / R61	14.1" wide	NISSEI	PIFA	3059797	465mm	-1.54	2.61	2.19	3059805	512mm	-0.01	0.86	1.60
R61/R61e	15.4" wide	Hitachi	PIFA	HMT14-MAIN	376mm	1.82	1.77	1.08	HMT14-AUX	484mm	1.54	2.62	1.47
X61/X61s	12.1" w MF	Wistron NeWeb	PIFA	25.90386.001	596mm	1.80	2.84	2.75	25.90386.001	640mm	1.83	2.83	2.73
				25.90383.001	596mm	1.78	2.83	2.74	25.90434.001	579mm	1.24	2.71	2.48
	12.1" w/o MF		PIFA	60.4B421.001	585mm	1.91	**2.89**	**2.86**	60.4B421.001	644mm	**1.93**	**2.89**	2.84
				60.4B422.001	585mm	1.88	2.87	2.75	60.4B537.001	575mm	1.87	1.57	2.48

MF: Metal Frame