

RF Exposure Justification in co-locating with other transmitters

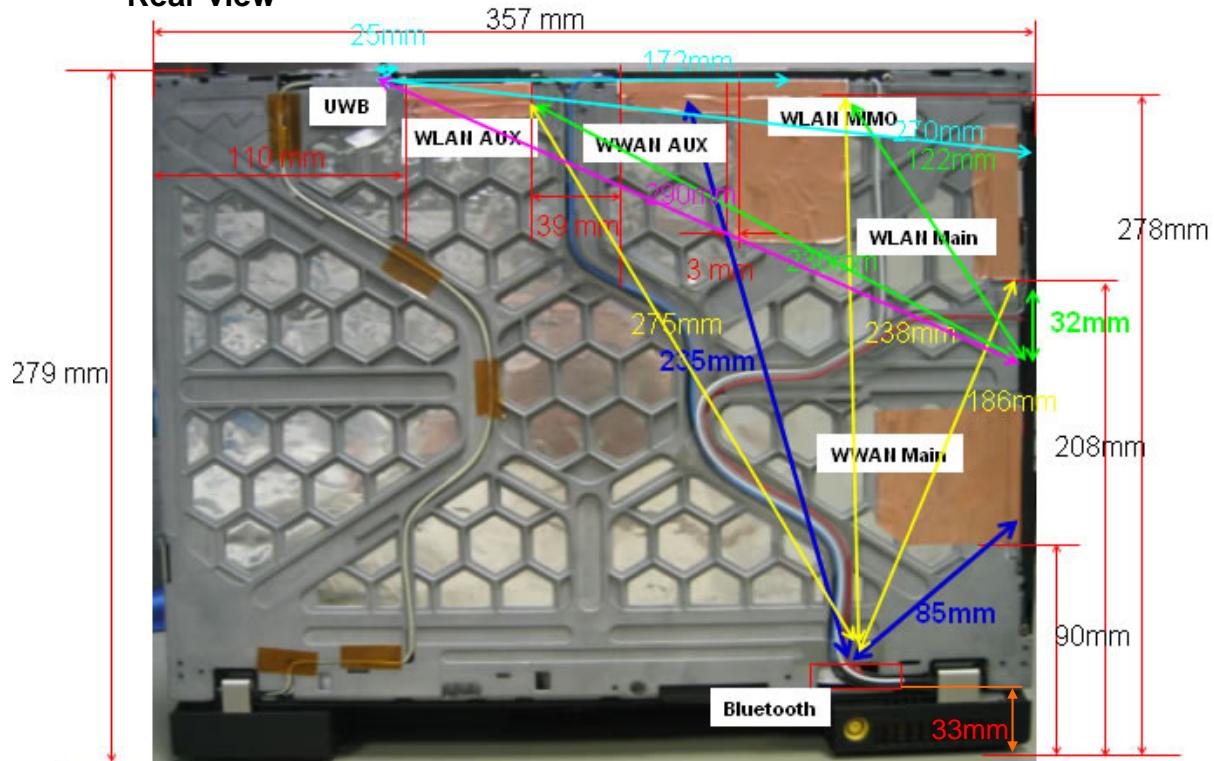
The subjected host PC (Lenovo ThinkPad T61 15.4-inch widescreen) was already authorized to use for the applying modular transmitter (FCC ID: **PPD-AR5BXB6**) with the last Class II Permissive Change approval.

The change under this permissive change is addition of co-location with a UWB transmitter as shown below.

Figure-1 ThinkPad T61 15.4-inch widescreen



Rear view



1. RF Exposure evaluation for the applying modular transmitter

As shown in Figure-1, the separation distance between human body and WLAN transmission antenna of the host PC device is 208mm.

Therefore the applying WLAN transmitter module (FCC ID: PPD-AR5BXB6) and the antenna system are subjected to "Mobile device" pursuant to FCC CFR 47 Section 2.1091.

[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 of ThinkPad T61 15.4-inch widescreen
2.4GHz band	0.190 W (22.8 dBm)	0.95 dBi
5.2GHz band	0.041 W (16.1 dBm)	2.77 dBi
5.5GHz band	0.060 W (17.8 dBm)	2.42 dBi
5.8GHz band	0.141 W (21.5 dBm)	2.42 dBi

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	23.75	237.1	0.047 mW/ cm ²
5.2GHz band	18.87	77.1	0.015 mW/ cm ²
5.5GHz band	20.22	105.2	0.021 mW/ cm ²
5.8GHz band	23.92	246.6	0.049 mW/ cm ²

With those results, the applying modular transmitter has found to comply with the FCC MPE limit (1.0 mW/cm²) according to FCC CFR 47 section 2.1091 for general Population/Uncontrolled exposure.

2. RF Exposure evaluation with co-located WWAN transmitter

The host PC device incorporates WWAN transmitter.

The WWAN Tx/Rx antenna and the WLAN antenna are co-located with **32mm** 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 device incorporates the following Bluetooth transmitter

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 separation distance between WWAN Tx/Rx antenna and Bluetooth antenna is 186mm, and both transmitters operate simultaneously. Therefore those transmitters are regarded as co-located devices.

The Bluetooth antenna is 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.

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

The applying host PC device 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.	April 20, 2007	0.0123 mW/ cm ² *1

*1: The value is referred from the UWB test report posted in the FCC Web site.

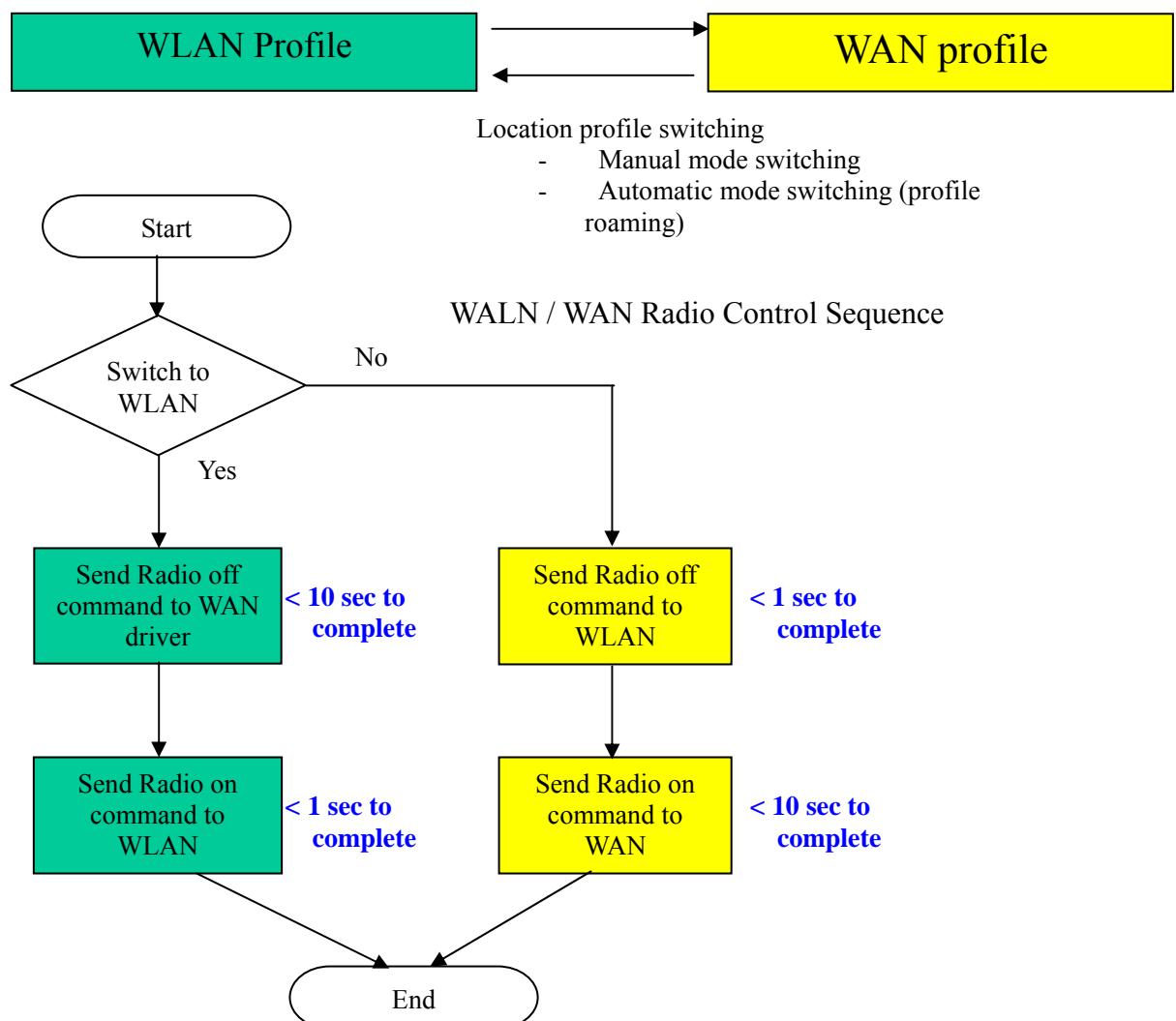
The UWB antenna is located at the top of LCD screen of the host PC and the separation distance from human body is 279mm. Therefore the UWB transmitter (FCC ID: MCLT60H990) and the antenna system are classified as "Mobile device" pursuant to FCC CFR 47 Section 2.1091.

The sum of MPE value of the applying WLAN transmitter and the UWB device is 0.0613 mW/ cm², so those devices have found to comply with the FCC MPE limit (1.0 mW/cm²) 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

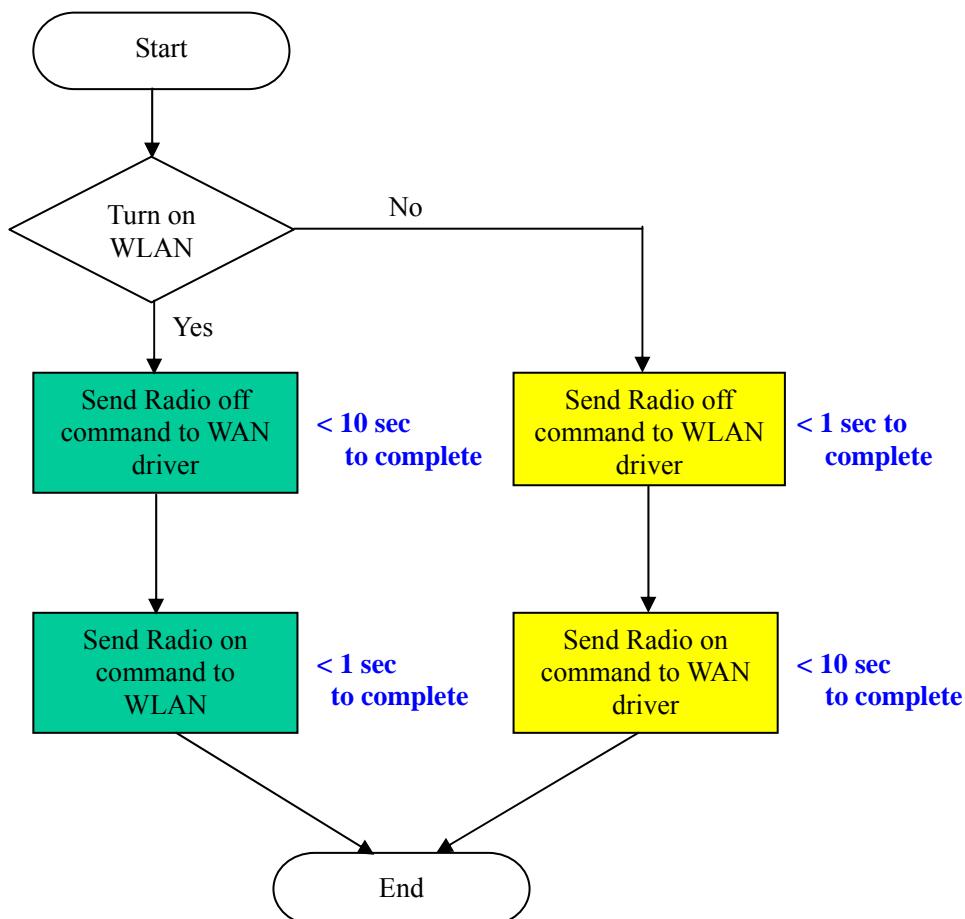
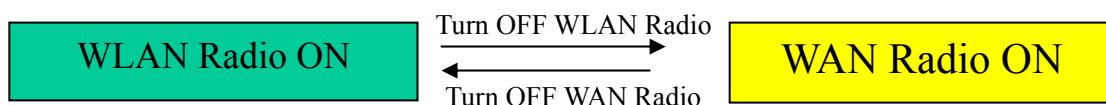
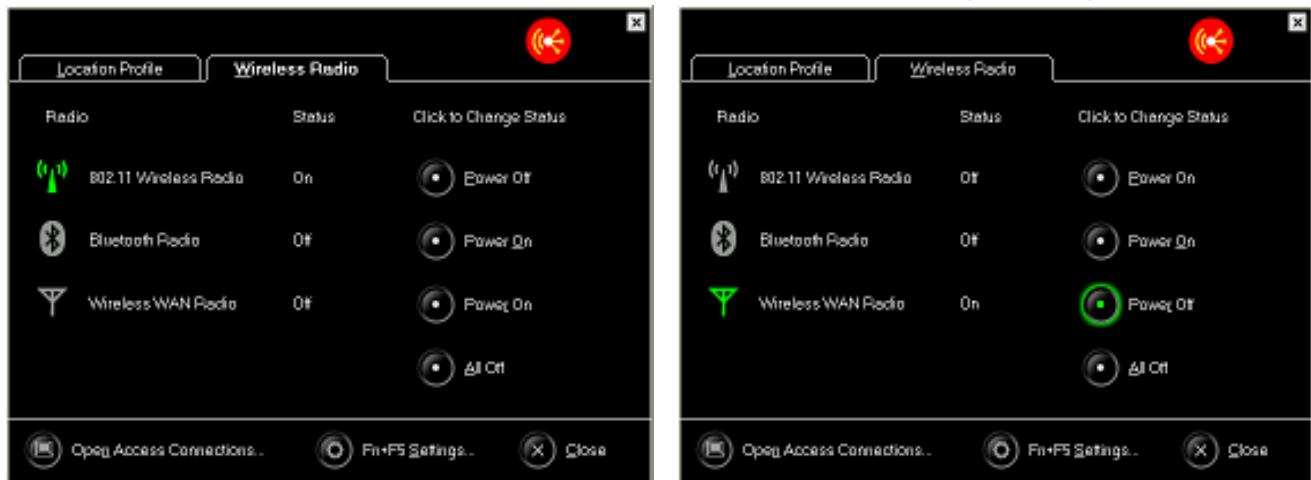
Location profile switching scenario

- 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.

