

**The Spectrum Future Conference**  
**Pacific Telecommunications Council**

**Spectrum Planning Progress**  
**in Taiwan**

**Vice Chairman, Yu, Hsiao-Cheng**

**National Communications Commission**

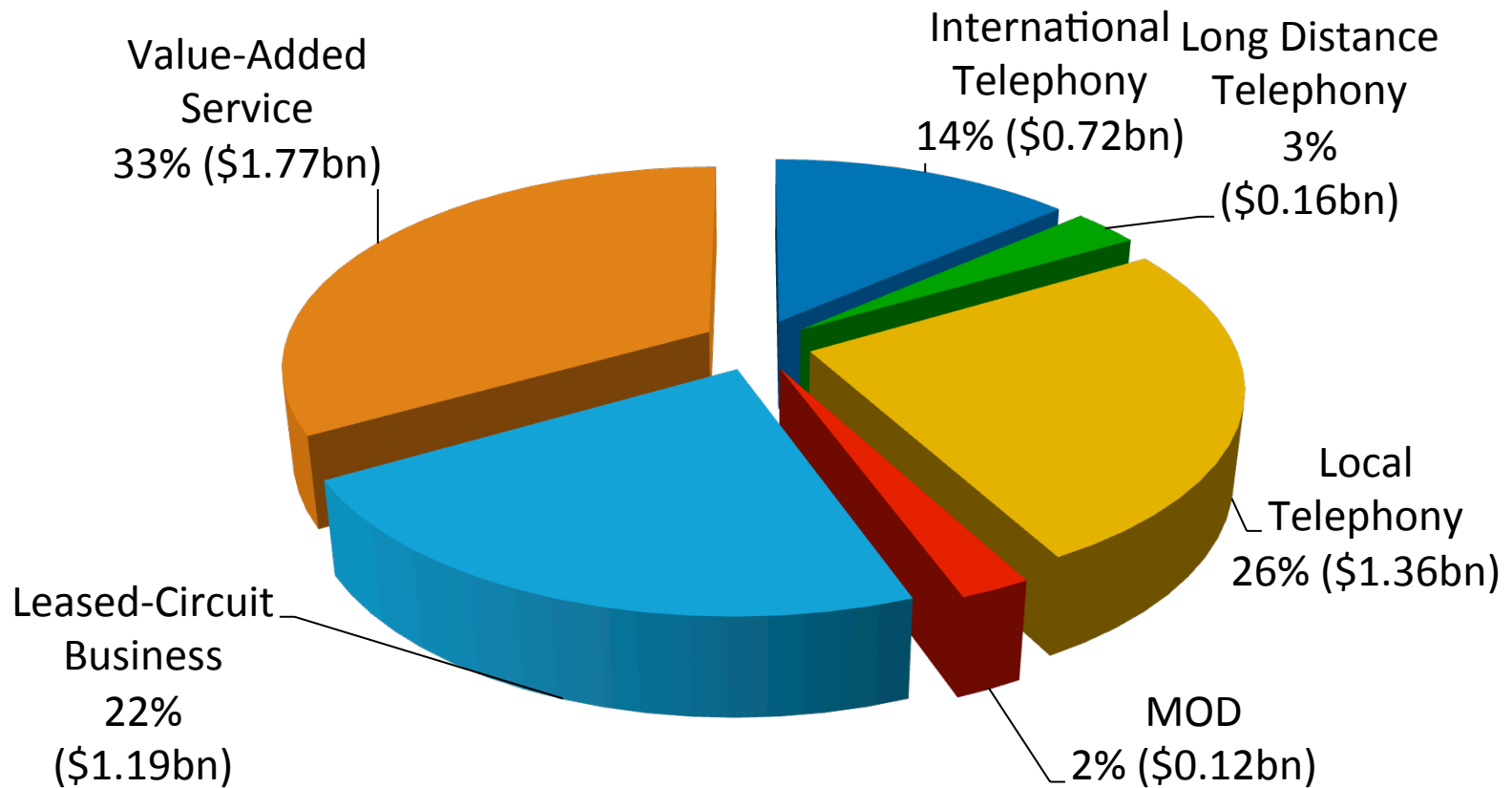
**Taiwan**

**Oct. 30, 2014**

# Spectrum Allocation in Taiwan

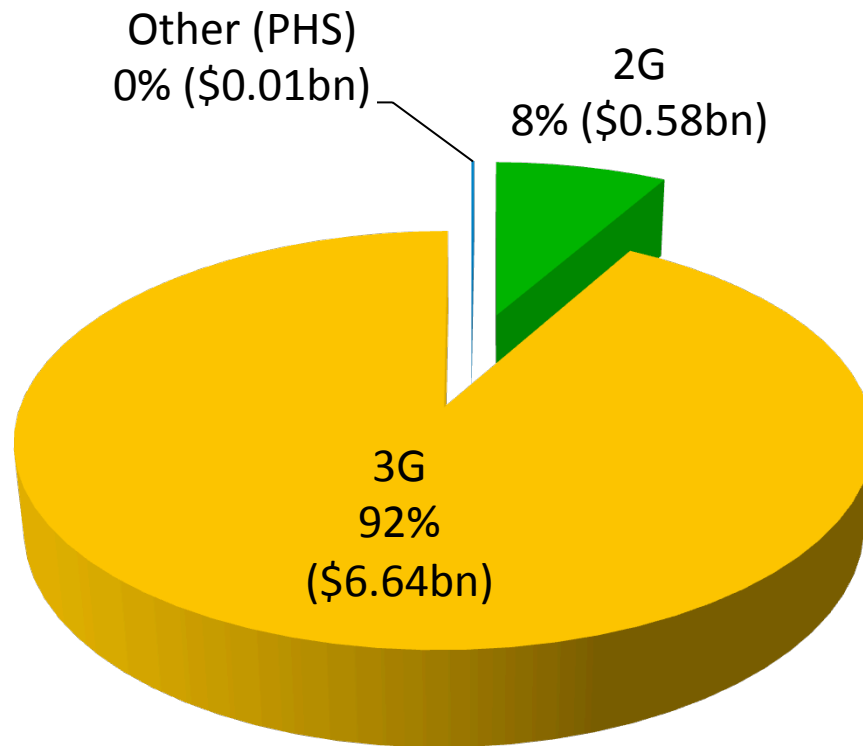
- ◆ **Telecom Market Status**
- ◆ **Existing Mobile Comm. Spectrum**
- ◆ **Upcoming Mobile Comm. Spectrum**
- ◆ **UHF Spectrum**
- ◆ **Unlicensed Spectrum**
- ◆ **Low-Power Wireless Microphone**
- ◆ **Short-Range Radar for Automobile**
- ◆ **Personal Locator Beacon**

# 2013 Revenues of Fixed-Line Services



**Total: USD 5.3 billion**

# 2013 Revenue of Mobile Services



**Total: USD 7.2 billion**

# 4G Spectrum Auction

- ◆ SMRA
- ◆ Auction sessions start on 9/3 end on 10/30, 2013

Winning Bidders	Bandwidth	Total Price
Chunghwa Telecom	70 MHz	USD 1,302 m
Far Eastone Telecom	60 MHz	USD 1,043 m
Taiwan Mobile	60 MHz	USD 967 m
Taiwan Star Cellular (Ting Hing)	20 MHz	USD 121 m
Asia Pacific Telecom	20 MHz	USD 214 m
Ambit Microsystem (Foxconn)	40 MHz	USD 306 m

# 4G Service Status

- ◆ There are five 4G operators. The top three operators launched 4G LTE services in end of May 2014, after fulfillment of the minimum requirement of 250 LTE BSs.
- ◆ Taiwan Star Telecom launched 4G service on 8/25, 2014.
- ◆ Asia Pacific Telecom has been granted permission to launch service on 10/22,2014.
- ◆ There are 2.7m 2G users and 25.5 m 3G users.
- ◆ There are 1.7 m 4G users and the number is expected to reach 3m by end of 2014.

# 4G Signal Coverage

- ◆ **Total of 6697 LTE BSs have been in operation and 5567 LTE BSs are under construction by 10/24 2014.**
- ◆ **95% of population will be covered by LTE signal by end of 2014.**



# Existing Mobile Comm. Spectrum

- ◆ 540 MHz spectrum have been assigned for 2G, 3G, 4G, WiMAX and PHS mobile services.

Band	Expiration Date	Band	Expiration Date	Band	Expiration Date
<b>700 MHz</b> (703-748、 758-803)	<b>4G</b> (2030.12.31)	<b>800 MHz</b> (825-845、 870-890)	<b>3G</b> (2018.12.31)	<b>900 MHz</b> (885-915、 930-960)	<b>4G</b> (2030.12.31)
<b>1800 MHz</b> (1710-1770、 1805-1865)	<b>4G</b> (2030.12.31)	<b>1900 MHz</b> (1885-1915)	<b>PHS</b> (1905-1915) (2016.4)	<b>2100 MHz</b> (1915-1975、 2110-2165)	<b>3G</b> (2018.12.31)
<b>2100 MHz</b> (2010-2025)	<b>3G TDD</b> (2018.12.31)	<b>2600 MHz</b> (2565-2625、 2660-2690)	<b>WiMAX</b> (2016)		

2G licenses expire on June 30, 2017.

4G spectrum auction in 2013 includes existing 2G spectrum.



# Upcoming Mobile Comm. Spectrum

- ◆ Releasing 190 MHz spectrum in **2.6 GHz band** (2500 - 2690 MHz) in 2015. Existing WiMAX operators currently are using 90 MHz.
- ◆ Auctioning, in 2016 - 2017 time frame, 205 MHz spectrum in **800 MHz**, **1900 MHz** and **2000 MHz** bands after 3G and PHS licenses expire.
- ◆ Will comply to ITU spectrum allotment in **2.3 - 2.4 GHz** and **3.4 - 3.6 GHz** bands for 4G mobile service.
- ◆ Will comply to international standards in **SDL(supplemental downlink)** and **LTE-U** technologies.

# UHF Spectrum

- ◆ **530 - 608 MHz** is allocated for six 6 MHz Single Frequency TV Networks.
- ◆ Other spectrum in UHF band (**300 - 700 MHz**) are under utilized and have potential for spectrum sharing.
- ◆ Transmitting at the same power level, an UHF BS can cover an area of 6 Km radius while a GSM (1800 MHz) BS can only cover an area of 2.5 Km radius.
- ◆ An indoor UHF band AP can replace 9 WiFi APs.

# Unlicensed Spectrum

Band	Technologies	Band Width
<b>2.4 GHz</b> (2400-2483.5 MHz)	IEEE802.11b/g/n	<b>83.5 MHz</b>
<b>5 GHz</b> (5250-5350 MHz、 5470-5825 MHz)	IEEE802.11a/n/ac	<b>455 MHz</b>

Will allocate **5150 - 5250 MHz** and **5825 - 5850 MHz** for unlicensed wireless LAN use.

Will allocate **57 - 66 GHz** for unlicensed small cell BS backhaul and WiGig use.

# Low-Power Wireless Microphone

- ◆ Wireless microphone operating in **794 - 806 MHz** band causes interference with 4G.
- ◆ New shared-use spectrum will be allocated for low-power wireless microphone.
  - **485 - 530 MHz** : Share use with police, fire department, taxi and other users.
  - **753 - 758 MHz** : 4G guard band. Must tolerate interference from 4G.
  - **1790 - 1805 MHz** : 4G guard band. Must tolerate interference from 4G.

# Short-Range Radar for Automobile

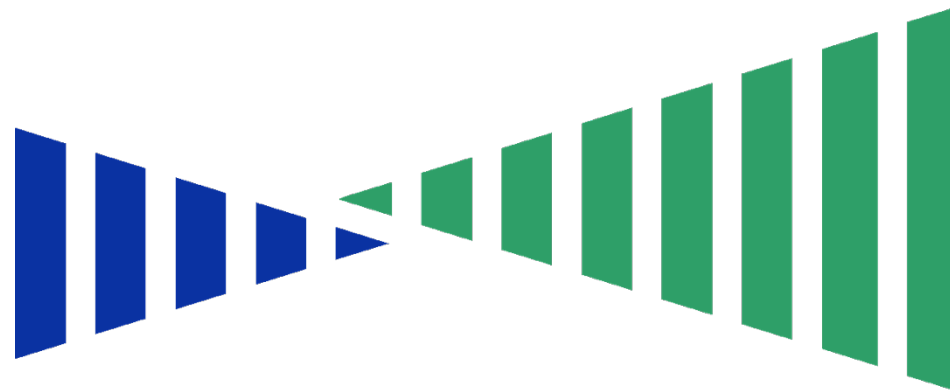
- ◆ **25.9 - 26.65 GHz** is existing spectrum for SRR.
- ◆ Expanding **24.25 - 25.9 GHz** spectrum for SRR.

# Personal Locator Beacon

- ◆ Frequency at **406 MHz** is allocated for PLB use.
- ◆ PLB equipment must conform to message format defined by COSPAS-SARSAT and pass type-approval by NCC.
- ◆ Must register at the Rescue Coordination Organization.
- ◆ No license or fee requirement imposed by NCC.

**Questions or Suggestions?**  
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# SPECTRUM FUTURES

WILL CHANGE EVERYTHING



**Singapore**

Oct. 29-30, 2014