

Use of L-band for IMT in Japan

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- History of L-band usage in Japan
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 - Benefits of FDD frequency arrangement in L-band
 - Co-existence issues in adjacent frequency bands
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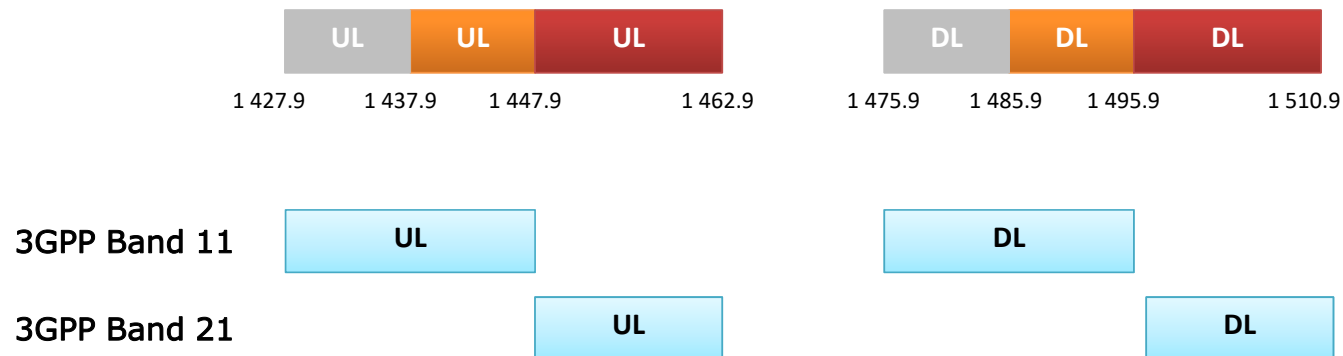
History of L-band usage in Japan (1)

- **The portions of the L-band frequency band were originally used for the 2nd generation of mobile communication systems in Japan.**
 - The operation of the 2G systems in this band was stopped in March 2010.
- **In 2006, the technical studies were conducted to investigate re-farming of the L-band frequency band for the potential introduction of 3G system.**
- **In 2008, the further technical studies were conducted for the introduction of LTE and HSPA evolution systems.**
 - These studies considered sharing and compatibility between these systems and incumbent systems.

History of L-band usage in Japan (2)

- In June 2009, the L-band frequency band was allocated three MNOs.
 - 2 x 35 MHz FDD arrangement is adopted
 - UL: 1 427.9-1 437.9 MHz UL & DL: 1 475.9-1 485.9 MHz DL (2 x 10 MHz)
 - UL: 1 437.9-1 447.9 MHz UL & DL: 1 485.9-1 495.9 MHz DL (2 x 10 MHz)
 - UL: 1 447.9-1 462.9 MHz UL & DL: 1 495.9-1 510.9 MHz DL (2 x 15 MHz)

Frequency allocations to MNOs



Current L-band usage in Japan

- **Currently, three MNOs are using this frequency bands for LTE.**

MNOs	UL band (MHz)	DL band (MHz)	Technology
Softbank	1 427.9-1 437.9	1 475.9-1 485.9	DC-HSDPA (since February 2011) LTE (since April 2017)
KDDI	1 437.9-1 447.9	1 485.9-1 495.9	LTE (since November 2012)
NTT DOCOMO	1 447.9-1 452.9	1 495.9-1 510.9	LTE (Since November 2012)

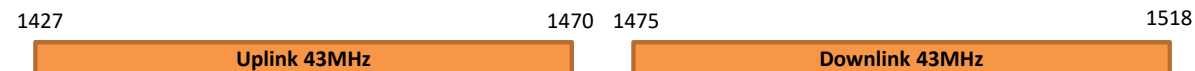
- **The number of base stations' licenses issued as of March 2020 is as follows.**
 - Softbank: 9 580 BS licenses
 - KDDI: 11 000 BS licenses
 - NTT DOCOMO: 30 187 licenses

- **In 2020, the technical studies were conducted for the introduction of 5G NR in the frequency bands which are currently being used for LTE systems.**
- **Based on the results of studies, the relevant national regulations were modified, which enable MNOs to migrate their LTE systems to 5G systems in the existing frequency bands, including the L-band.**

3GPP specifications for FDD operations in L-band (1)

- After WRC-15, 3GPP has developed Band 74 specifications for those countries who wish to deploy FDD-LTE networks in the frequency band 1 427-1 518 MHz.
 - 2 × 43 MHz, uplink: 1 427 – 1 470 MHz, downlink: 1 475 – 1 518 MHz
 - 1.4, 3, 5, 10, 15 and 20 MHz channel bandwidths
- 3GPP has also completed development of corresponding 5G (NR) specifications for this arrangement, named Band n74.

3GPP Band 74/n74 in the 1427-1518 MHz frequency band



Existing band plans for Japan



- **Within the 43 MHz bandwidth per link, for example,**
 - The 5 MHz × 8 blocks could be used for mobile broadband applications,
 - The remaining 3 MHz could be used for IoT applications using narrower channel bandwidth (< 5 MHz).
- **Depending on the situations of every country, portion(s) of the 2 x 43 MHz FDD frequency arrangement can be used.**
 - For example, in the case of Japan, only 2 x 35 MHz is used.

- **Flexible spectrum assignment by administrations**

- Stand-alone FDD operations by only using the L-band is possible.
- Therefore, spectrum can be assigned to new operators and/or existing operators flexibly.

- **Flexible network operations by operators**

- Stand-alone FDD operations by only using the L-band is possible.
- In FDD operations, no synchronized operation is required among MNOs in the adjacent bands.
- A large cell deployment is possible (good propagation characteristics compared to higher frequency bands).

- **Difficult to find paired spectrum for FDD operations of IMT systems**
 - If the re-farming of the UHF band is difficult in your countries, the L-band may be the final band to use for FDD operations.
- **Existing eco-system/market in Japan**
 - The new FDD arrangements by 3GPP (Band 74 for LTE and n74 for 5G NR) are an extension of the 3GPP Bands 11 & 21 for LTE being used in Japan.
 - If MNOs in Japan migrate their LTE to 5G NR, they will use 3GPP Band n74.

- **Compatibility with the EESS(passive) below 1 427 MHz**
 - The 3GPP specifications for Band 74 and n74 are stipulated in order to meet the unwanted emission levels in Resolution 750 of the ITU Radio Regulations.
- **Compatibility with the MSS above 1 518 MHz**
 - If the frequency assignment is up to 1 517 MHz, the results of study by CEPT can be applicable.

Final remarks

- ASEAN countries are invited to consider adoption of the FDD frequency arrangement in the L-band. 😊
- I am happy to talk with you further, if any further information is required.