

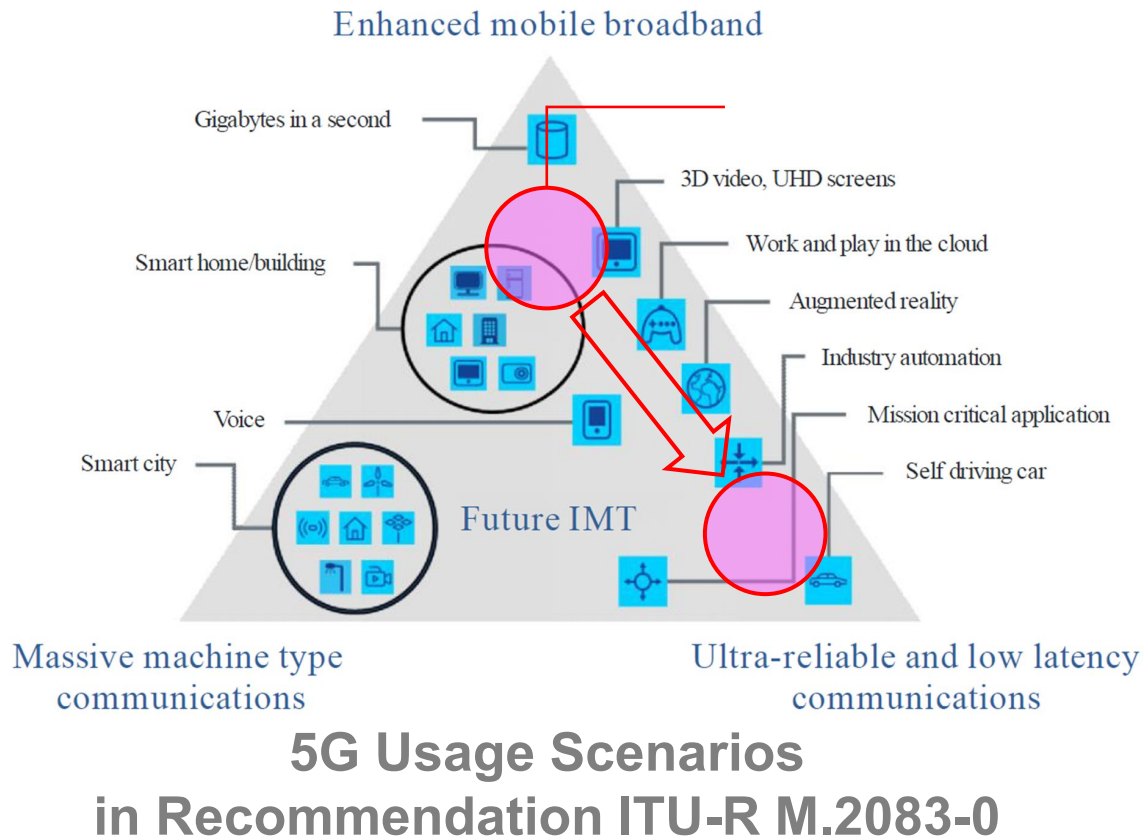
# Remote Robotic Surgery via 5G

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Speaker: Yukihiro OKUMURA, NTT DOCOMO, INC., Japan

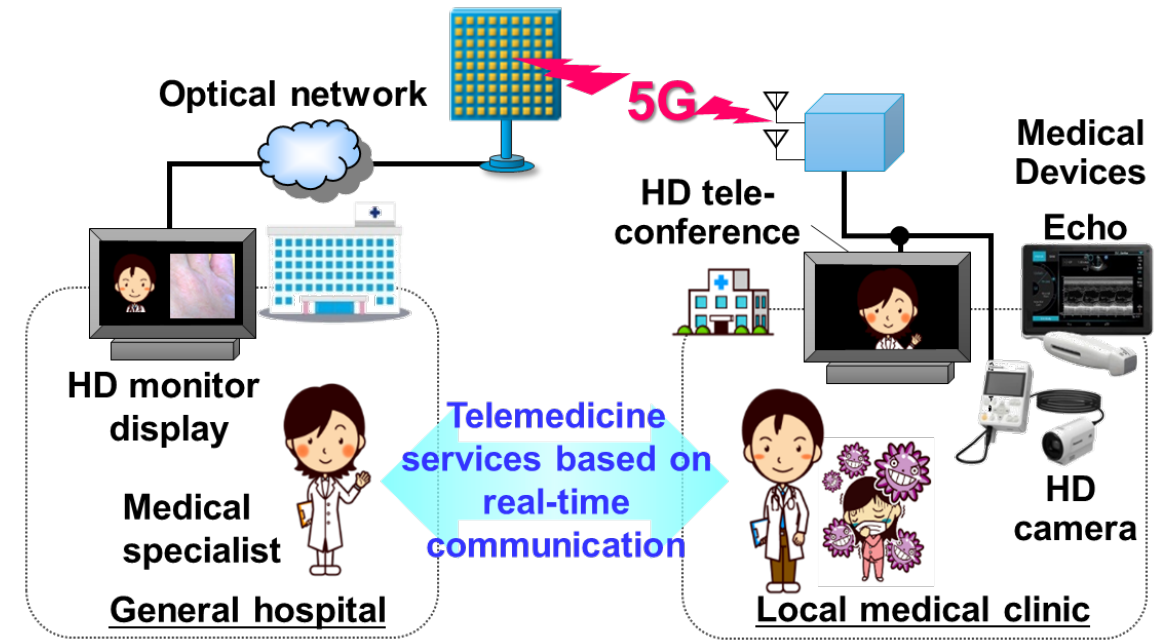
# Features of 5G and Utilization in Telemedicine

## Telemedicine with HD images/videos

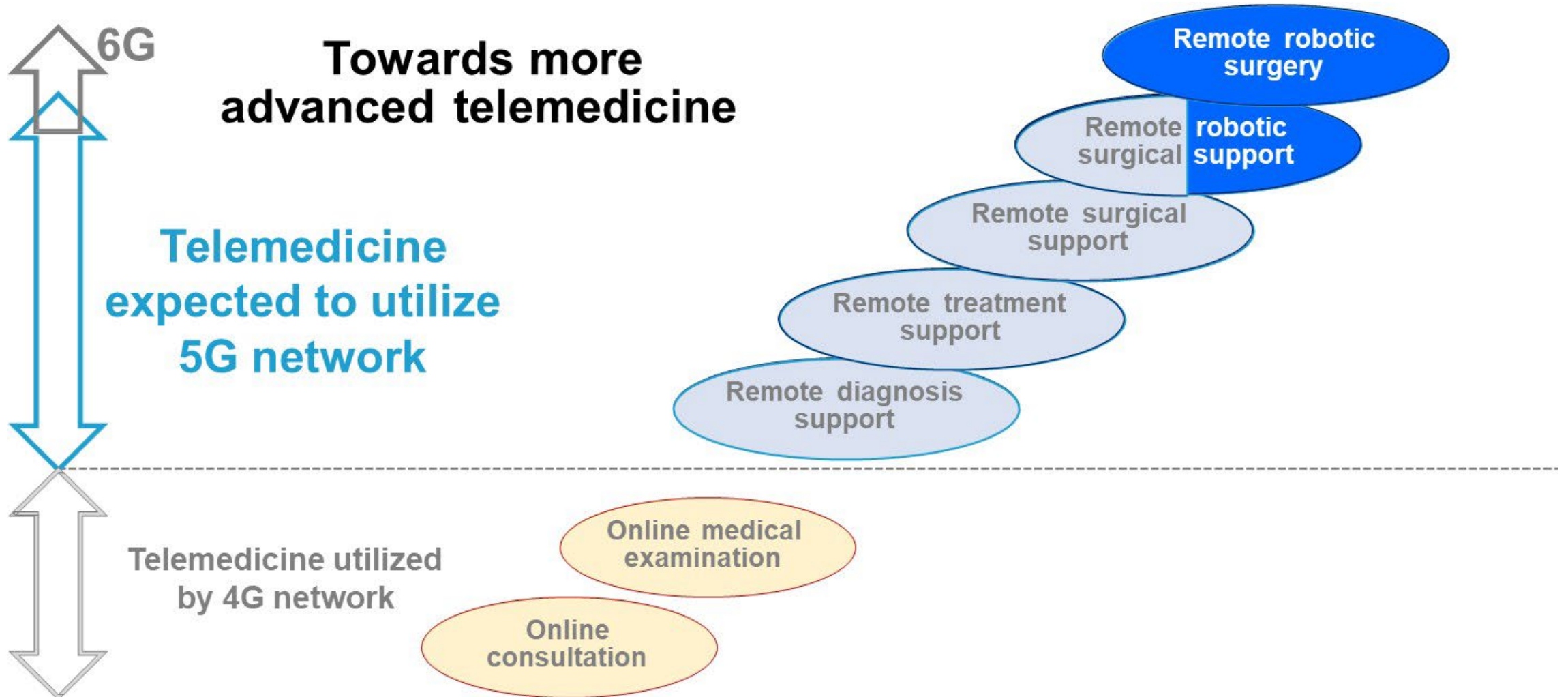


## Advanced D to D Telemedicine by 5G

Doctor to Doctor telemedicine services using high-definition diagnostic images/videos via 5G can provide advanced medical care in a wider area.



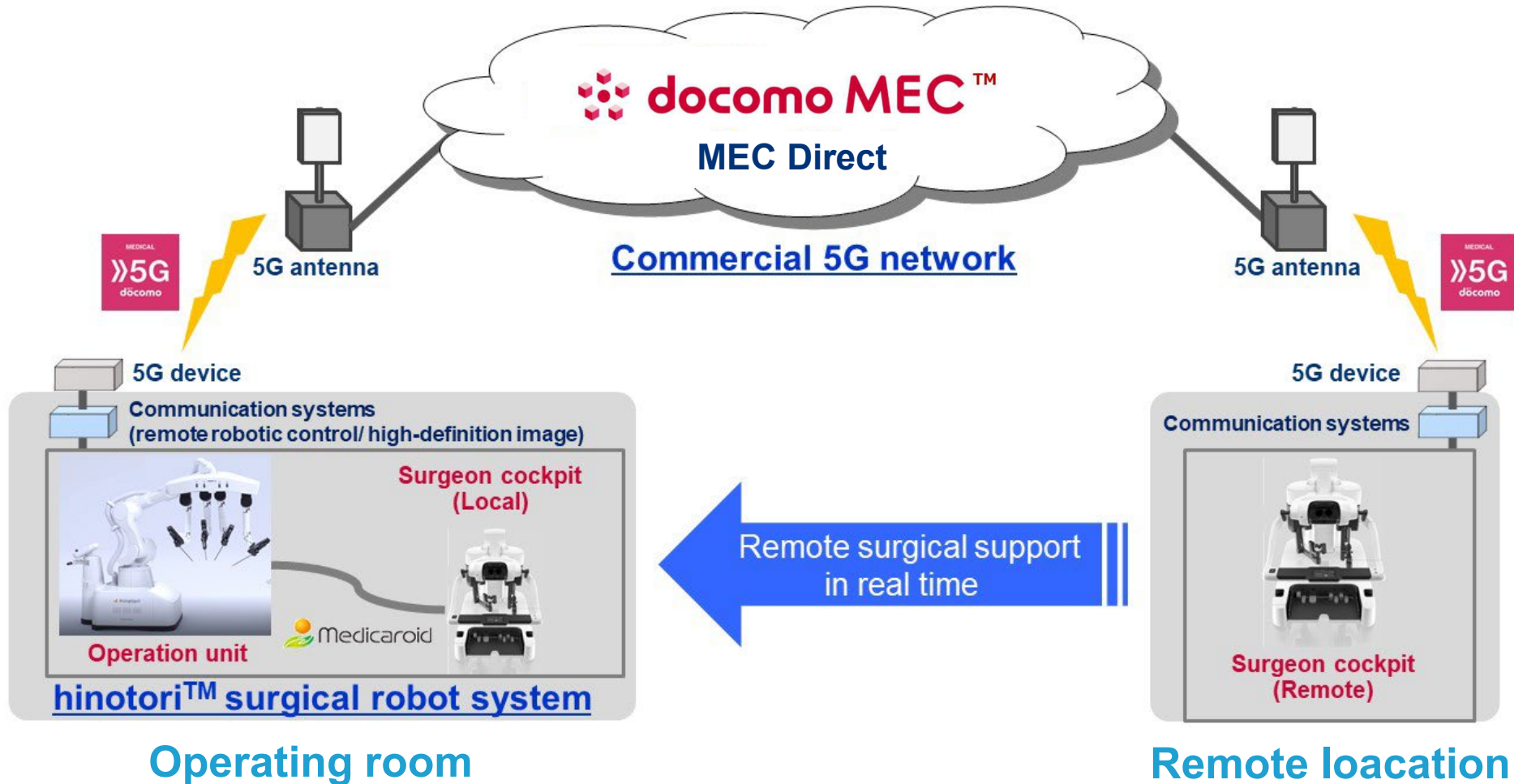
# Accumulation of Technologies for Sophisticate Telemedicine



# Remote Robotic Surgical Support via Commercial 5G Network and Cloud Infrastructure

- ✓ Although robotic surgery has become widespread in current medical practice, it is concentrated in urban areas and there are large regional disparities in medical care.
- ✓ In association with this issue, there are concerns such as a decrease in the number of educational opportunities for young surgeons in rural areas and an increase in the working time of surgeons in urban areas.
- ✓ To overcome these hurdles, Japanese National University and Partners have demonstrated cases of remote robotic surgery including remote support via the 5G network and cloud infrastructure since 2021, under the framework of Kobe Vision for the Healthcare of Tomorrow Initiative promoted by Kobe City in Japan.

# Remote Robotic Surgical Support via Commercial 5G Network and Cloud Infrastructure

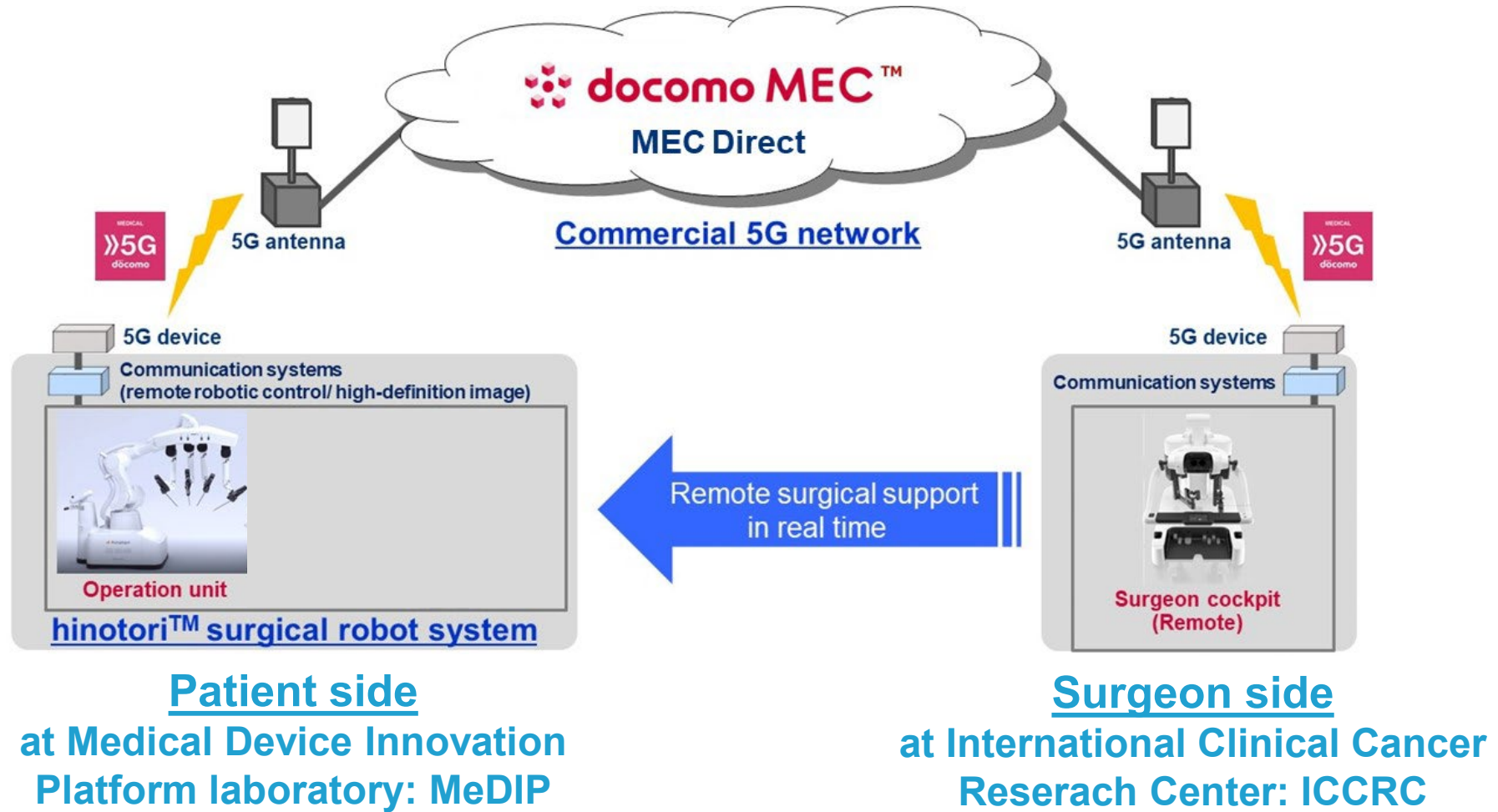


Key partners

- KOBE UNIVERSITY
- NTT docomo
- NTT Communications
- Medicaroid
- KOBE UNESCO City of Design



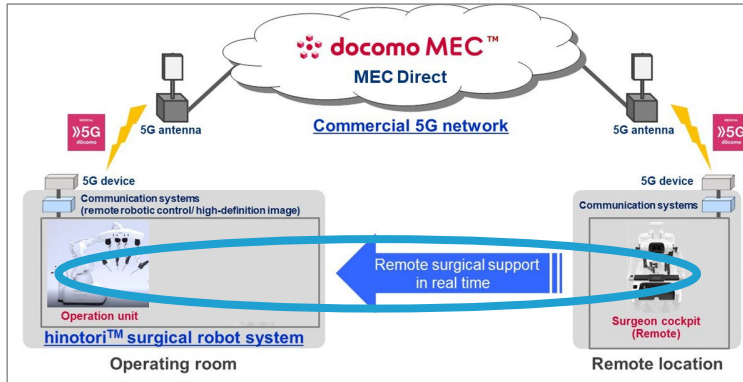
# PoC of 5G Remote Robotic Surgery in Kobe City



Related press release on 16<sup>th</sup> Apr. 2021 (in Japanese) :

[https://www.docomo.ne.jp/binary/pdf/corporate/technology/rd/topics/2021/topics\\_210416\\_00.pdf](https://www.docomo.ne.jp/binary/pdf/corporate/technology/rd/topics/2021/topics_210416_00.pdf)

# Key Components in PoC of 5G Remote Robotic Surgery



## Surgical robot system

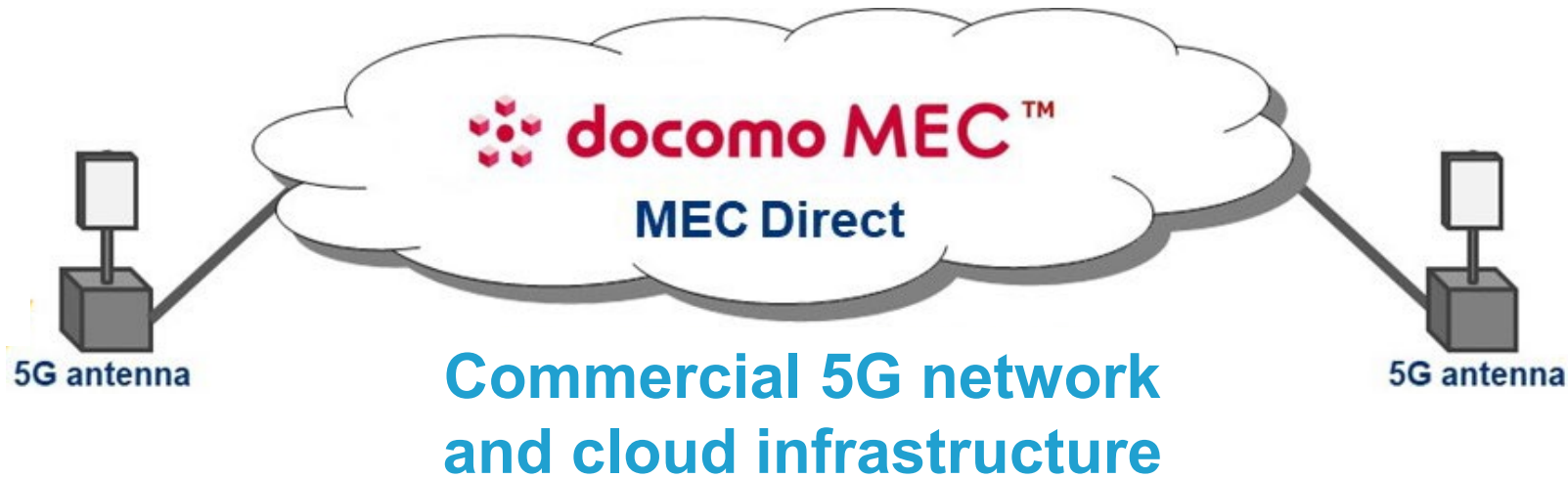


Operation unit

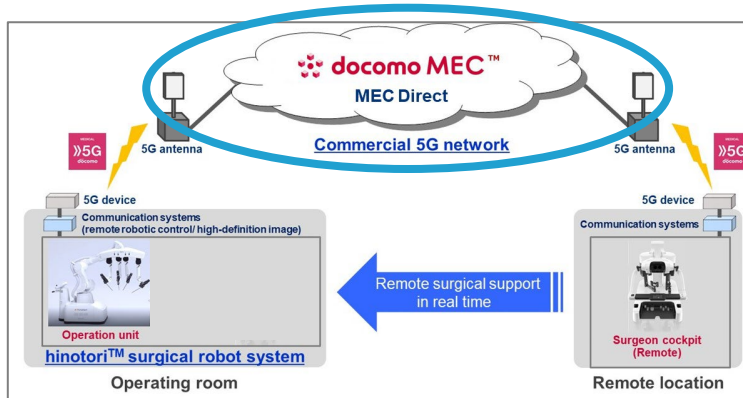
Surgeon cockpit

- ✓ In 2020, a commercial surgical robot system was launched for the first time in Japan.
- ✓ The system comprises an operation unit with compact robotic arms similar to human arms, an ergonomically designed surgeon cockpit, and a vision unit that produces high-definition 3D images.

# Key Components in PoC of 5G Remote Robotic Surgery



✓ Since it is separated from the Internet and only authenticated terminals can be connected, highly confidential information can be safely managed in an IaaS environment.

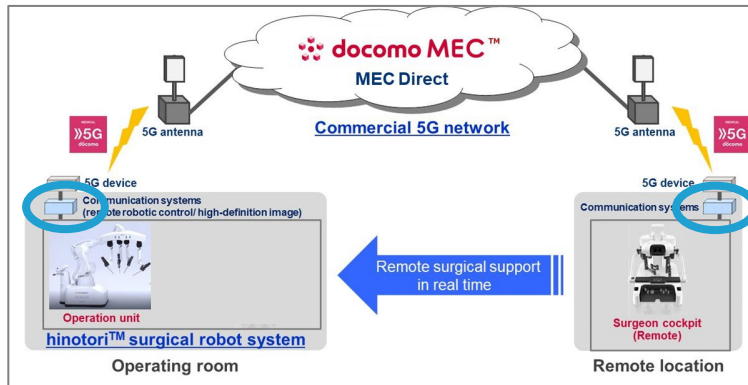


✓ A new SA configuration was adopted for the commercial 5G network, and docomo MEC™ was connected via MEC Direct as a cloud infrastructure.

✓ This configuration provides a network capable of high-speed, low-latency, and secure communication between operating room and remote location.



# Key Components in PoC of 5G Remote Robotic Surgery



## 5G device



**5G Gateway**  
**(Customer Premises Equipment: CPE)**

- ✓ 5G Gateway is a CPE-type 5G device that supports both Sub6 and mmW frequency bands.
- ✓ It is a fixed type device that suppresses temperature rise and enables stable high-speed communication even when used continuously for a long time.

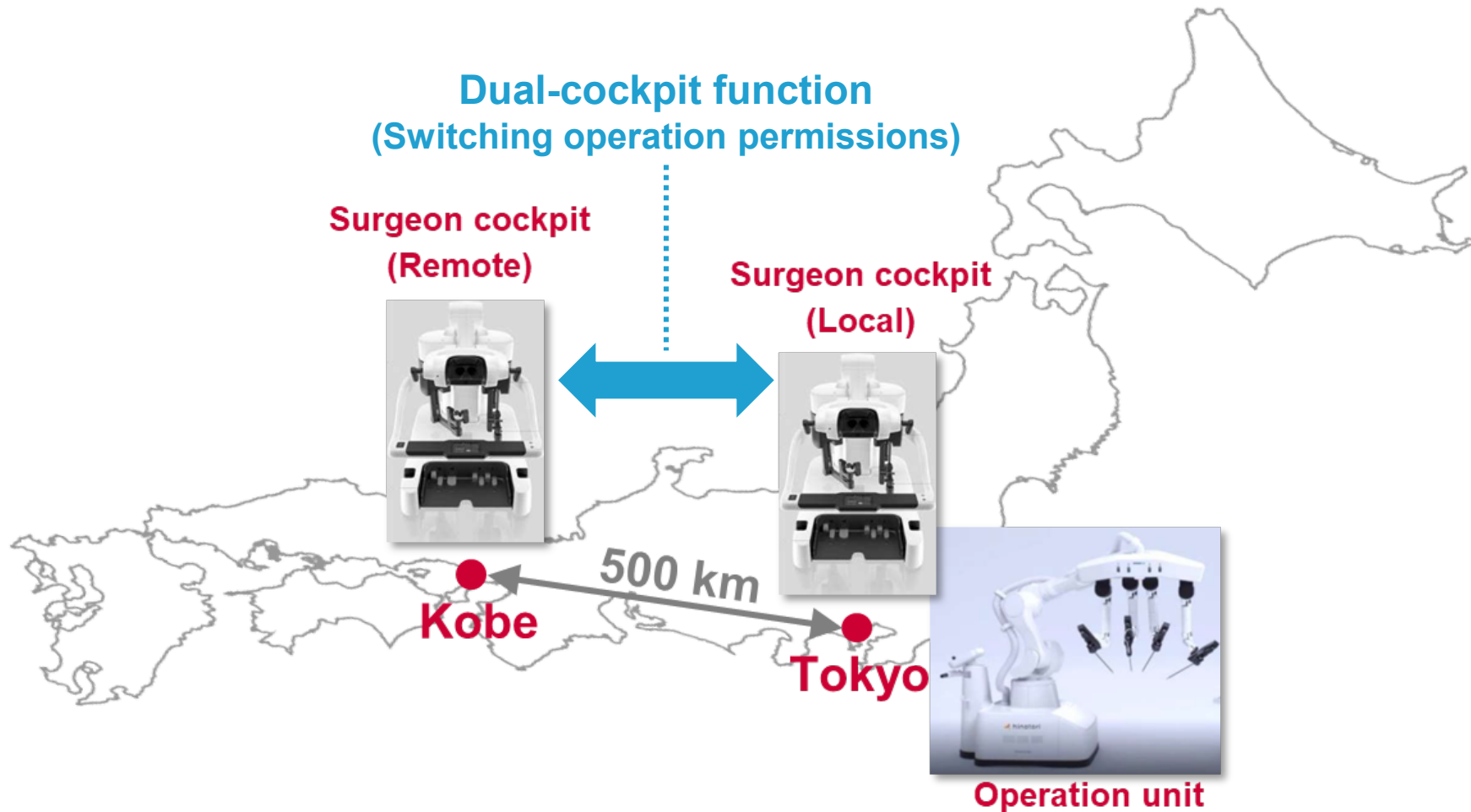
## [PHOTOS] PoC of 5G Remote Robotic Surgery

Surgeon side at ICCRC

Patient side at MeDIP

Achieved remote control with low-latency via a commercial 5G

# Trial of Long-distance 5G Remote Robotic Surgery in Japan



- ✓ A newly developed dual cockpit was introduced into the surgical support robot system.
- ✓ With this dual-cockpit, surgeons from both sites can share the same surgical video while performing voice communication, and it is possible to switch the robot's operating authority according to the situation.

Related press release on 1<sup>st</sup> Feb. 2023 (in Japanese) :  
[https://www.docomo.ne.jp/binary/pdf/info/news\\_release/topics\\_230201\\_01.pdf](https://www.docomo.ne.jp/binary/pdf/info/news_release/topics_230201_01.pdf)



# Trial of Long-distance 5G Remote Robotic Surgery in Japan



Kobe



Tokyo

## Concluding Remarks

- ✓ When this system is implemented in society, it will be possible to operate a single surgical robot from multiple remote locations, and it will be possible to receive surgical support from skilled doctors in urban areas even in rural areas.
- ✓ It is possible to provide advanced surgical care regardless of location, and to correct regional disparities in medical care. In addition, remote guidance can contribute to improving the quality of education for young doctors and improving the working styles for doctors.
- ✓ Furthermore, by utilizing 5G, it is possible to use low-cost, uniform high-speed communication without introducing special network infrastructure at each hospital, and it is also possible to eliminate cables in the operating room.
- ✓ This remote robotic surgery technology is expected to become a highly versatile telemedicine solution, and is also expected to contribute to easing medical problems in many countries and regions especially those with expansive land areas that are facing a lack of medical resources.