

Engagement in Cloud Platform & Edge Computing

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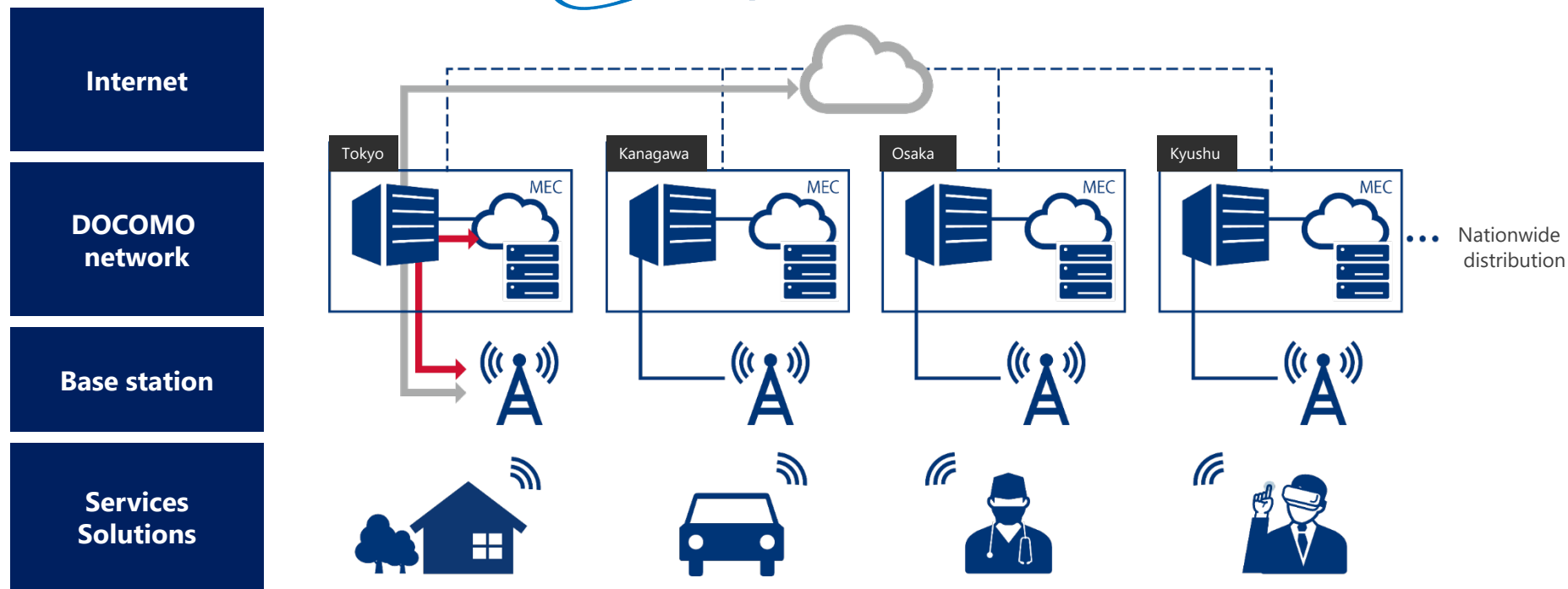


NTT DOCOMO's Engagement in Cloud Platform and Edge Computing

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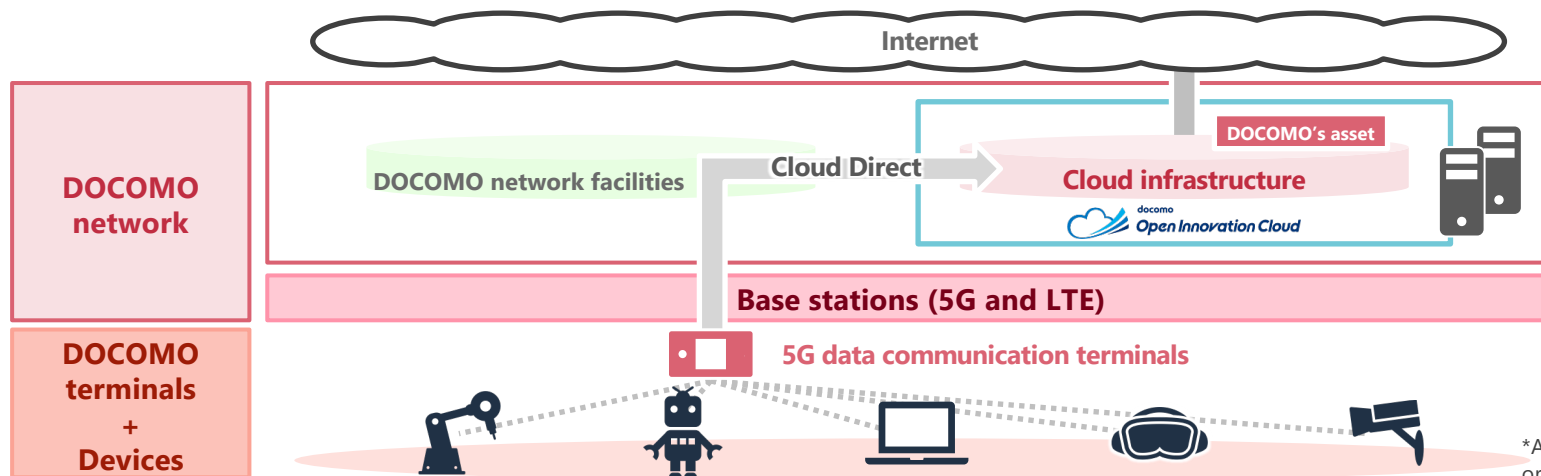
Core Network Development Department
NTT DOCOMO, INC.

NTT DOCOMO has launched low-latency cloud services in March 2020



What is DOCOMO Open Innovation Cloud?

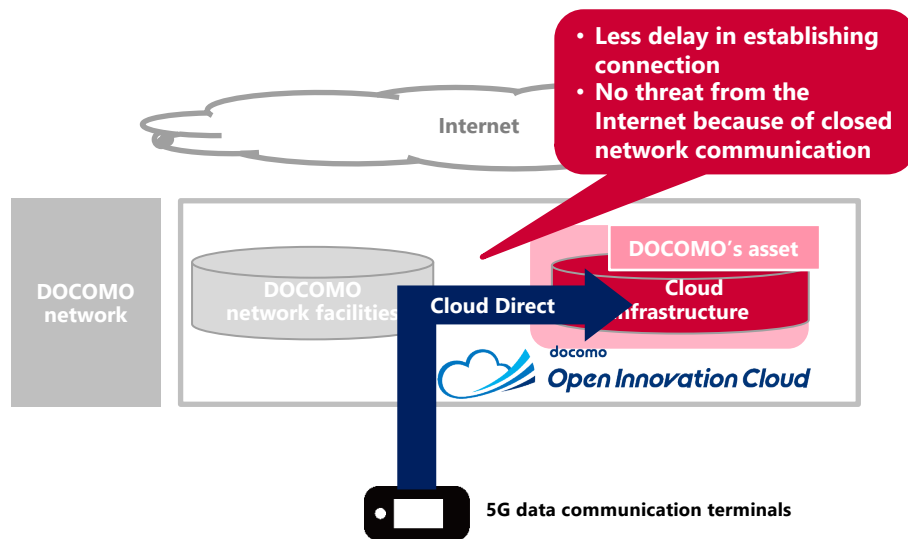
- IaaS provided by NTT DOCOMO: Virtual machine instances, virtual networks, etc.
- Cloud with MEC features enabled by direct connection with DOCOMO's network and four locations in Japan
- Developers can use **DOCOMO's technology assets (e.g. image recognition APIs)**
- Optional service **Cloud Direct™** can
 - ✓ **Reduce network transmission delay**, which is required in the 5G era
 - ✓ Provide **Secure and closed network communications** by connecting users' environment directly to DOCOMO's network
 - ✓ Provide a **Network-on-demand** feature that enables users to flexibly change where to connect their devices



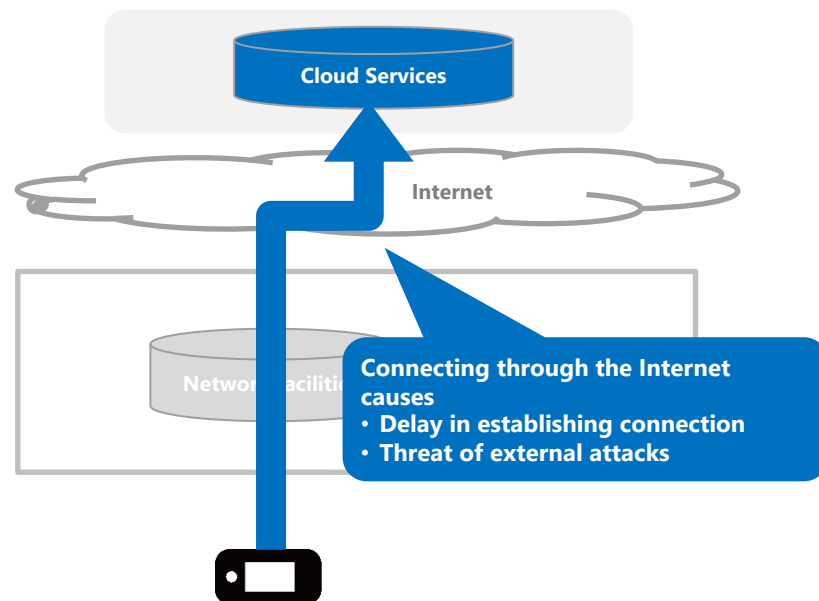
DOCOMO Open Innovation Cloud vs Public Cloud

- Public clouds are connected via the Internet, while DOCOMO Open Innovation Cloud provides direct access to the cloud.
- Using DOCOMO Open Innovation Cloud, low-latency and high security communication is realized

DOCOMO Open Innovation Cloud

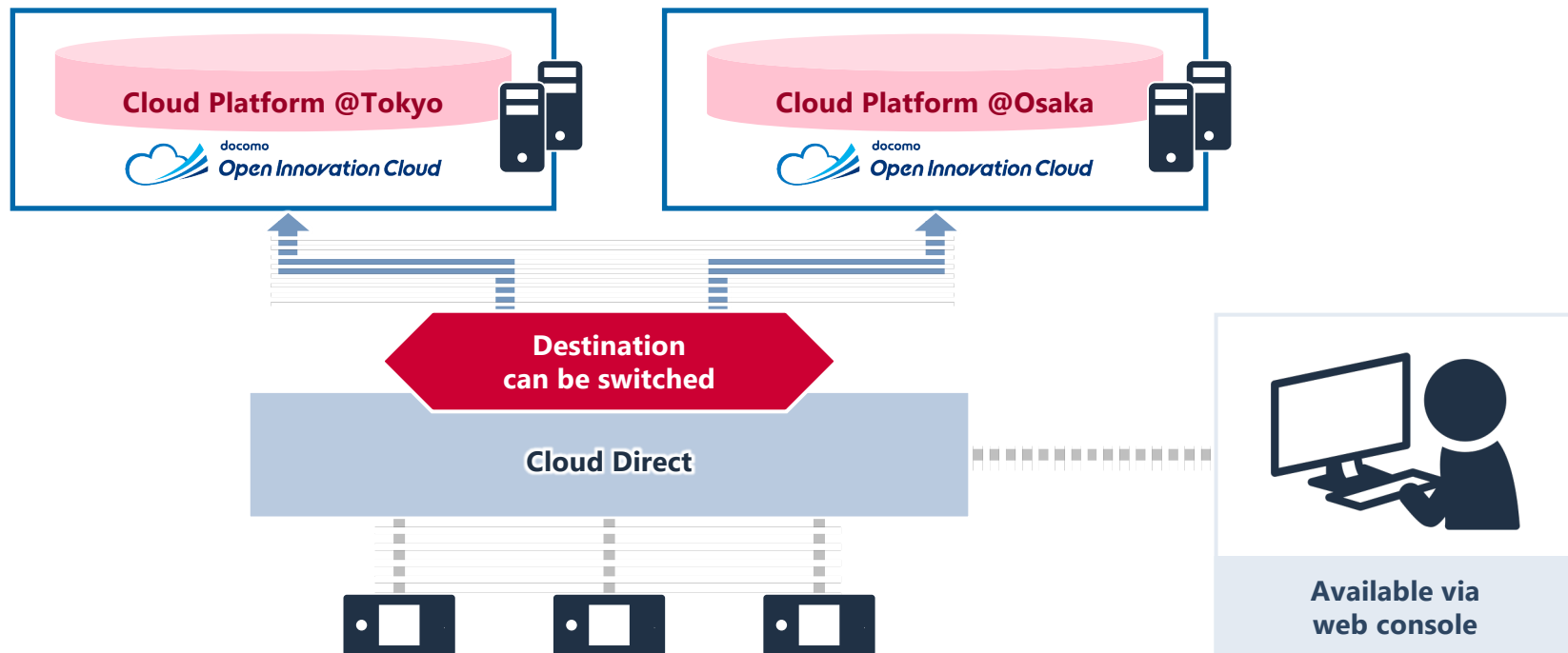


Typical Public Cloud



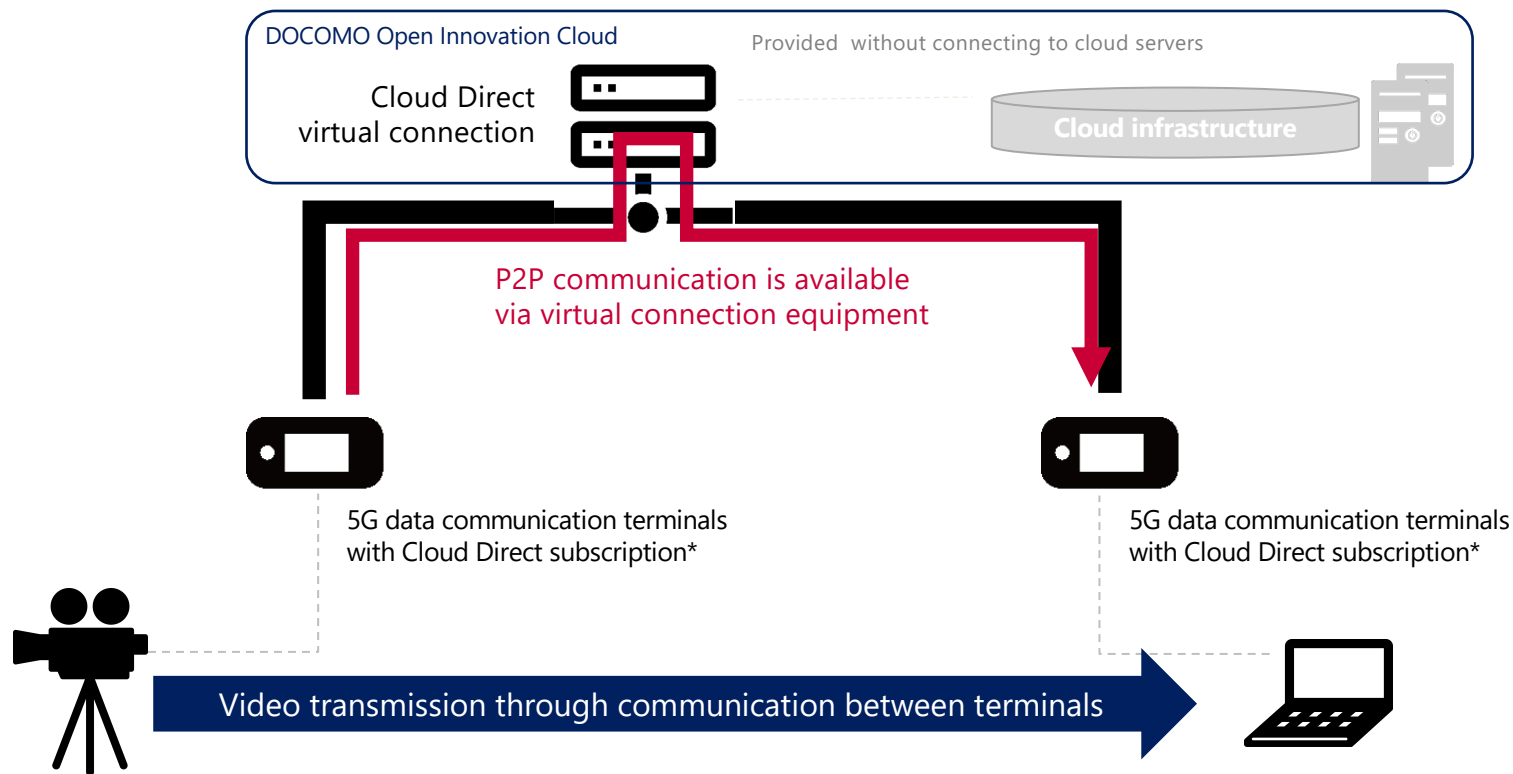
“Network-on-demand” control of destinations

- Users can flexibly switch the destination and/or configure closed networks by themselves (“Network-on-demand”)



P2P communication using Cloud Direct

P2P communication without going through cloud servers is also possible.



*Subscribing a dedicated plan for Cloud Direct is needed

{ Developers' Document }

Virtual machine instances and virtual networks enables low-latency, high-security communications.

Solution development is accelerated by using the group of assets provided by DOCOMO.



Compute V

Service to provide an execution environment for VMware-based virtual machines



Cloud Direct™

Closed network connection service that realizes low latency, high security, and MEC

Concept

What is Cloud Direct™?

First-step guide

First step

SIM-to-SIM communication test

Connection with virtual machines

Reference

SIM & Service management

[SIM group management](#)

Usage volume

Trouble shooting

SIM group

One SIM group is created for each virtual data center on Compute V / Compute O.
Data communication SIM always belongs to one SIM group. One SIM cannot belong to multiple SIM groups.

● List of SIM groups

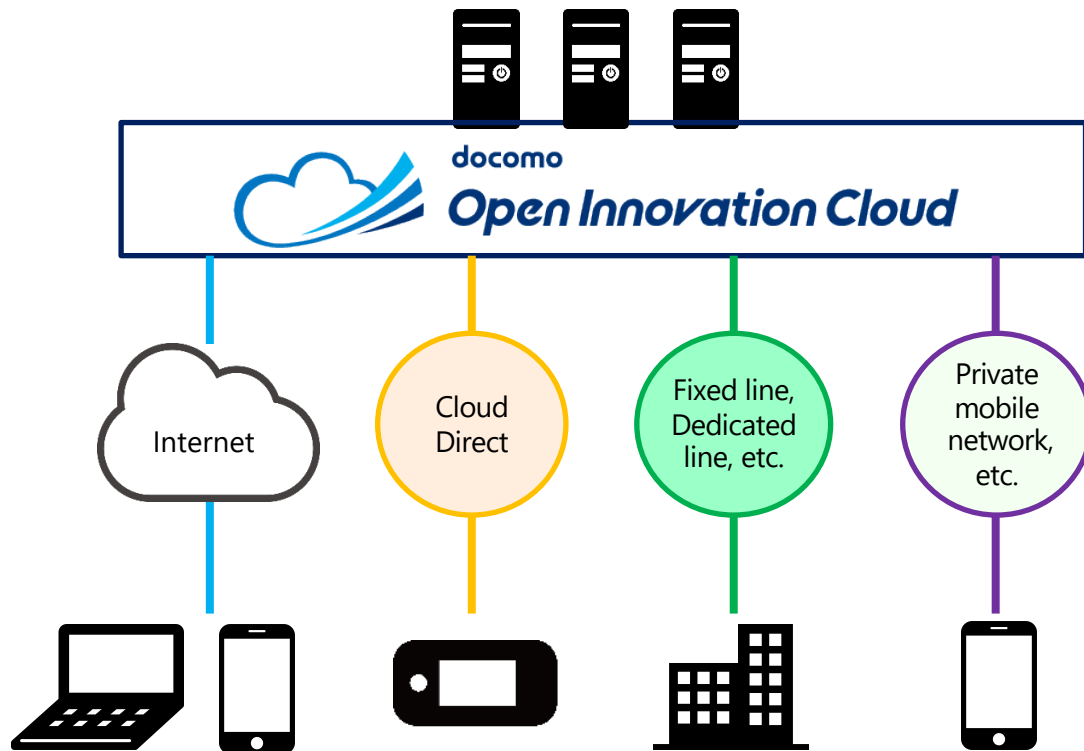
SIM group name	Location	FP	VGW	Custom DNS
Name of SIM group	Name of the location to which the SIM group is assigned	Field partner name	VGW information in service	DNS address used by SIM group

Field partner

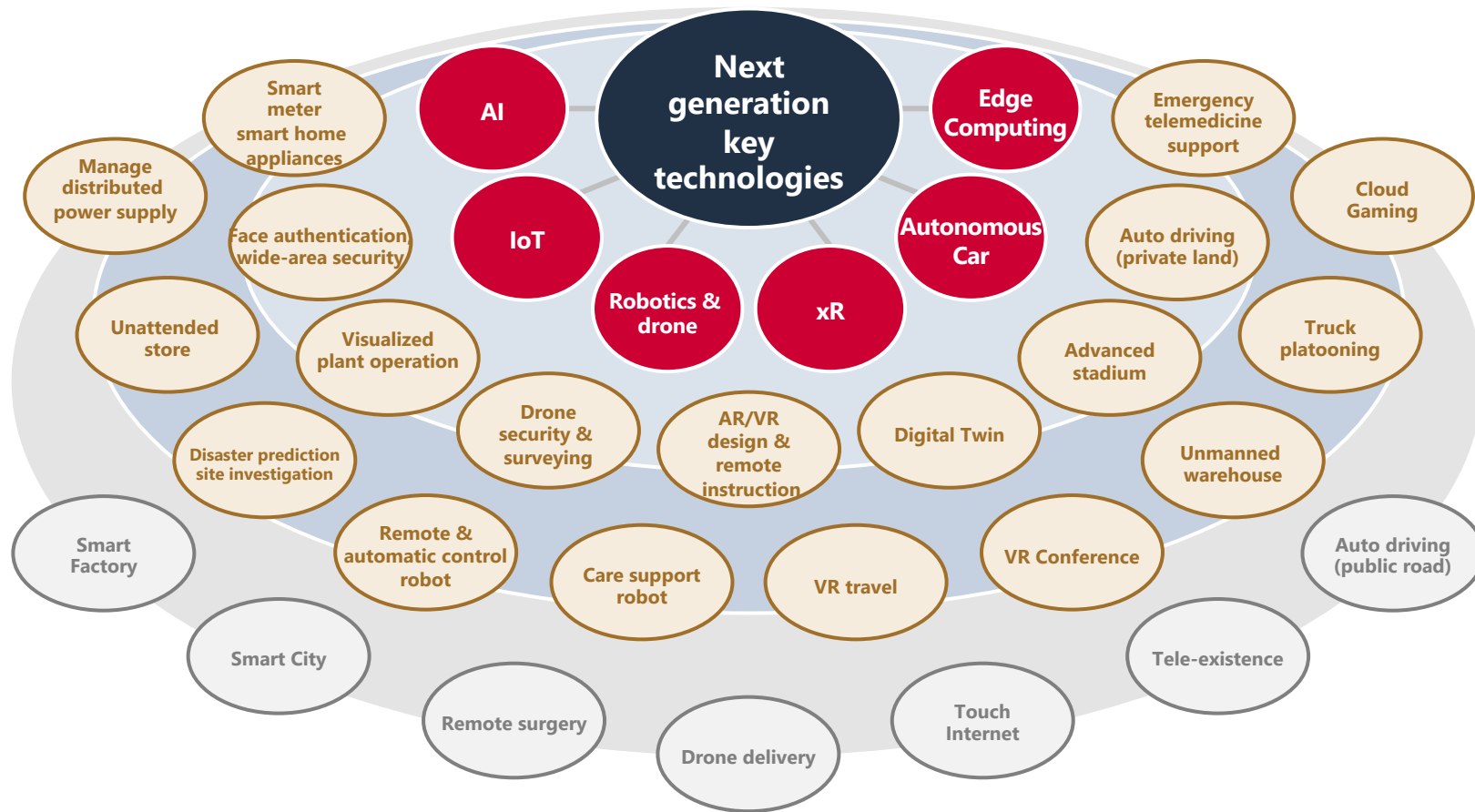
You can add field partner names to SIM groups as an identifier.

Other features of the DOCOMO Open Innovation Cloud

- DOCOMO Open Innovation Cloud is accessible via a variety types of connections, such as Internet, Cloud Direct, fixed line, and private mobile network.








Possible low latency use-cases



*3GPP 's 74 5G use cases focused on low latency solutions (Source: 3GPP "TR 22.862", etc.)

Case 1: Face Recognition Solution SAFR



	Face detection	Detect & track people
	Face recognition	Recognize & identify people (Match against database)
	Gender estimation	Estimate male or female
	Age estimation	Estimate age
	Feeling estimation	Estimate feelings, detect smiles



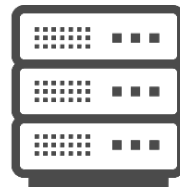
Person



IP camera



Face recognition
software



ICT infrastructure



Cooperative apps

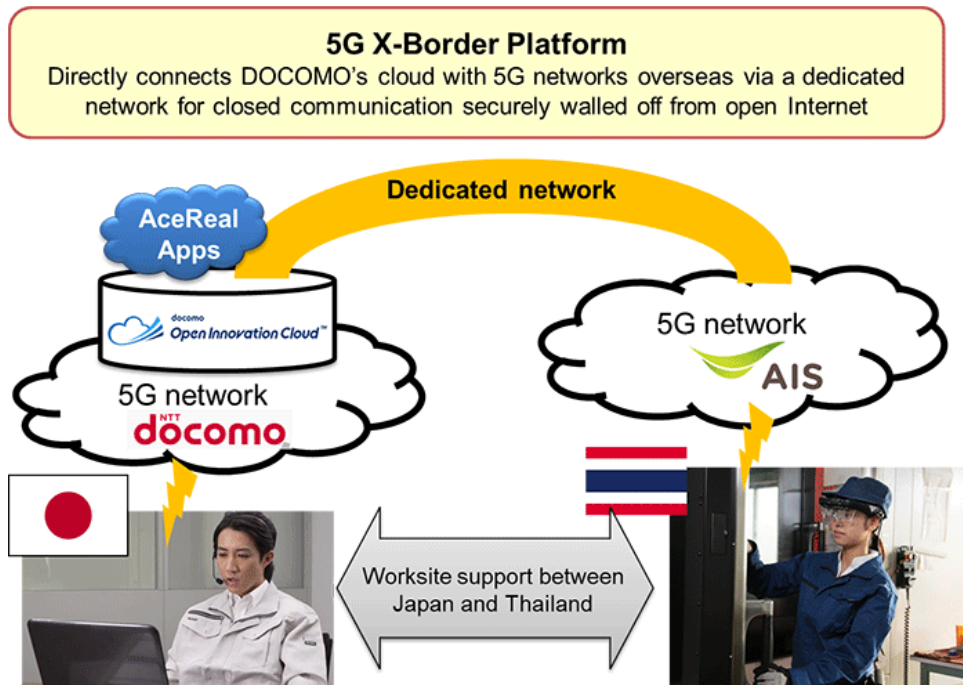
Case 2: Remote Assistance Solution "AceReal for DOCOMO"

Remote and real-time technical support



5G X-border Platform

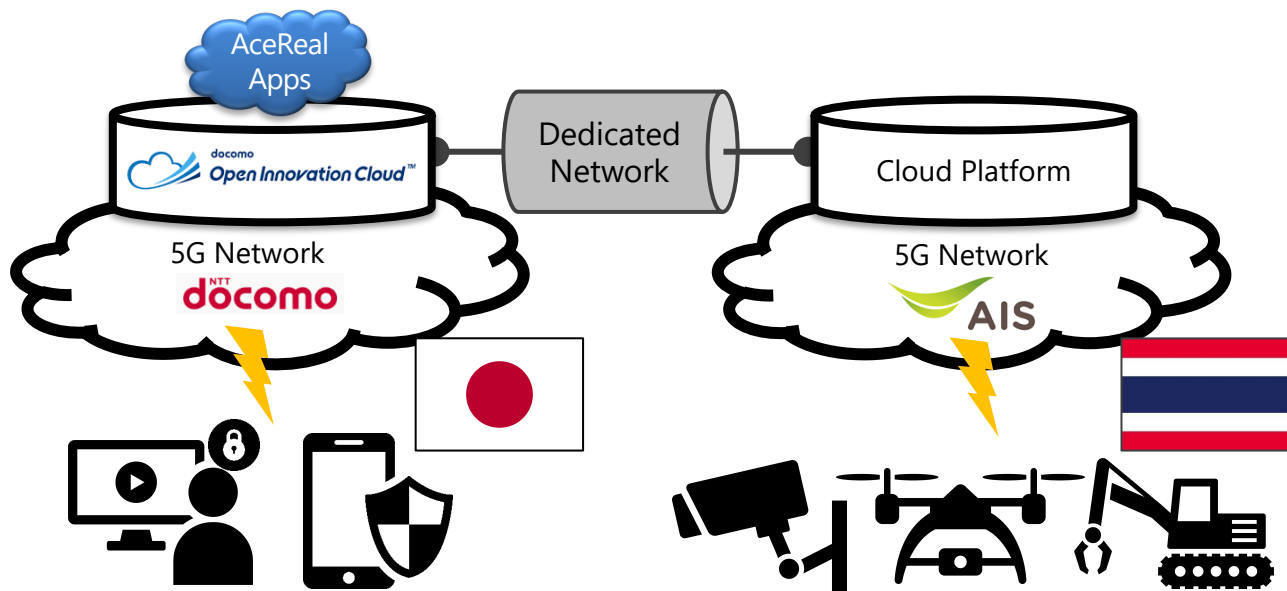
- 5G X-border Platform allows customers to use cloud services in secure cross-border environments
- DOCOMO initially use the platform to offer a global version of the AceReal solution



Architecture of 5G X-border Platform

5G X-border Platform uses a dedicated network to solve the following problems:

- Images and data transmitted to/from AceReal are highly sensitive information and thus secure communication is required
- Internet communication with overseas results in poor communication quality (e.g. packet losses, high jitter, high latency)



Conclusion

- NTT DOCOMO has launched DOCOMO Open Innovation Cloud as DOCOMO's private cloud platform
- Cloud Direct option can reduce network transmission delay and provide secure and closed network communications
- NTT DOCOMO has already provided various solutions with partners using DOCOMO Open Innovation Cloud
- 5G X-border Platform directly connects DOCOMO Open Innovation Cloud with 5G networks overseas, which can be a trial of Operator Platform

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