Engagement in Cloud Platform & Edge Computing

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NTT DOCOMO
NTT DOCOMO’s Engagement in Cloud Platform and Edge Computing

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

DOCOMO Open Innovation Cloud™

Internet

DOCOMO network

Base station

Services Solutions

Nationwide distribution

Tokyo

Kanagawa

Osaka

Kyushu

MEC

MEC

MEC

MEC
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

![Diagram of DOCOMO Open Innovation Cloud](image-url)
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 vs Typical Public Cloud**

- **DOCOMO Open Innovation Cloud**
  - Less delay in establishing connection
  - No threat from the Internet because of closed network communication

- **Typical Public Cloud**
  - Connecting through the Internet causes
    - Delay in establishing connection
    - Threat of external attacks

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“Network-on-demand” control of destinations

- Users can flexibly switch the destination and/or configure closed networks by themselves (“Network-on-demand”)
P2P communication without going through cloud servers is also possible.

**P2P communication using Cloud Direct**

Provided without connecting to cloud servers

*Subscribing a dedicated plan for Cloud Direct is needed*
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

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**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**

<table>
<thead>
<tr>
<th>SIM group name</th>
<th>Location</th>
<th>FP</th>
<th>VGW</th>
<th>Custom DNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of SIM group</td>
<td>Name of the location to which the SIM group is assigned</td>
<td>Field partner name</td>
<td>VGW information in service</td>
<td>DNS address used by SIM group</td>
</tr>
</tbody>
</table>

**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 | SAFR from realnetworks | ICT infrastructure | Cooperative apps
Case 2: Remote Assistance Solution "AceReal for DOCOMO"

Remote and real-time technical support

Workers at worksite

Supporters

Work support application

AceReal Apps

Displaying manuals

Process checklist
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
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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