ITU-T Kaleidoscope 2009
Innovations for Digital Inclusion

MOBILE-NGN ARCHITECTURE BASED ON REST CONCEPT

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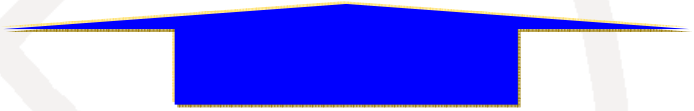
Background

- A few communication carriers control the entire mobile communication markets based on the vertical integration model.

- The open user-centric business model is necessary to grow up the market.
  - MIC, Japan: the mobile business activation plan
  - O' Droma, Ireland: the "ubiquitous consumer wireless world" (UCWW)
  - Murata, Japan: Open Heterogeneous Mobile Network (OHMN)

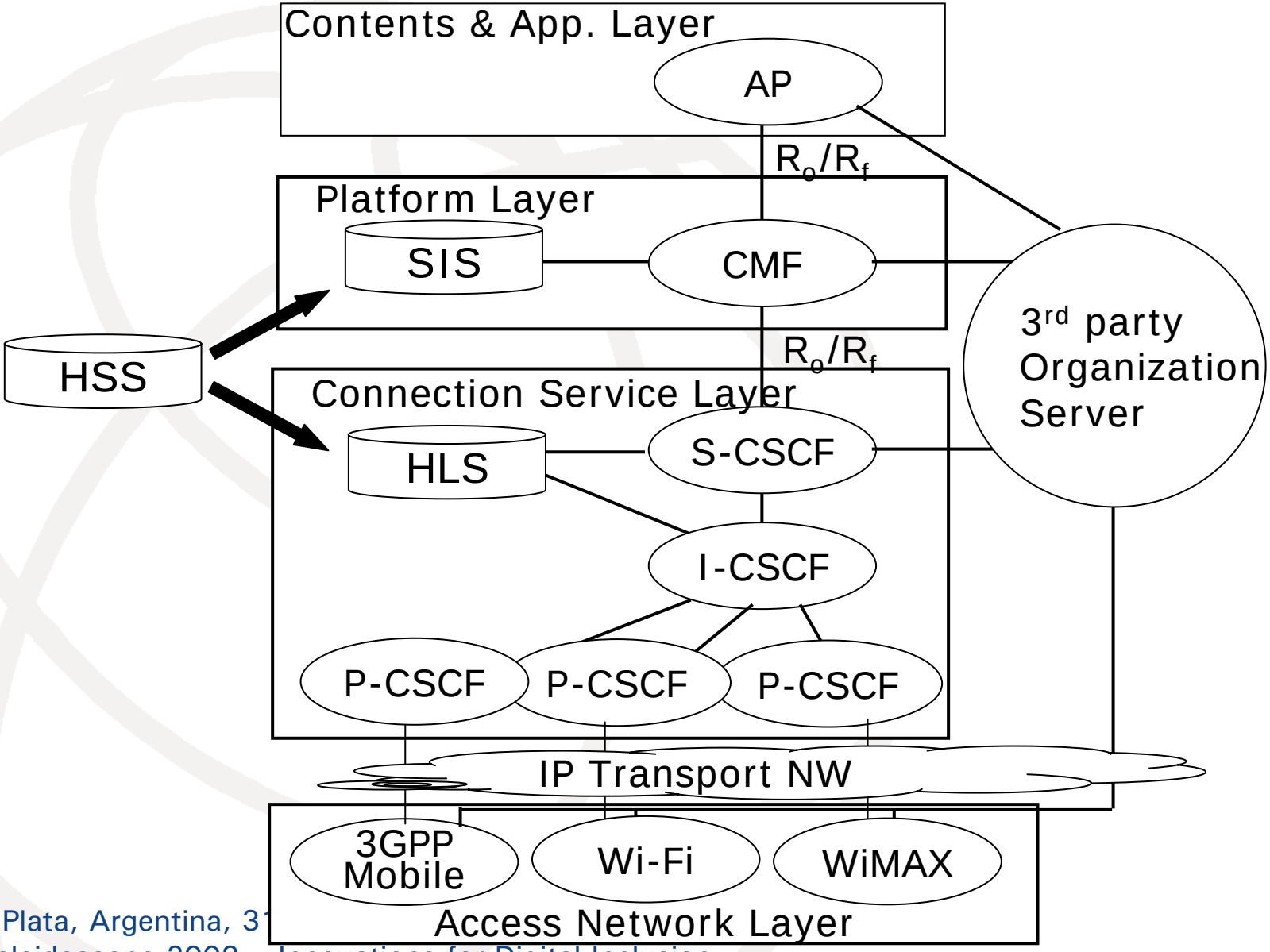
Design policy

- Design theme: 3Fs
  - Consumer can freely select business players.
  - Market must be flat for new comers.
  - Network architecture must be flexible for a wide variety of applications.

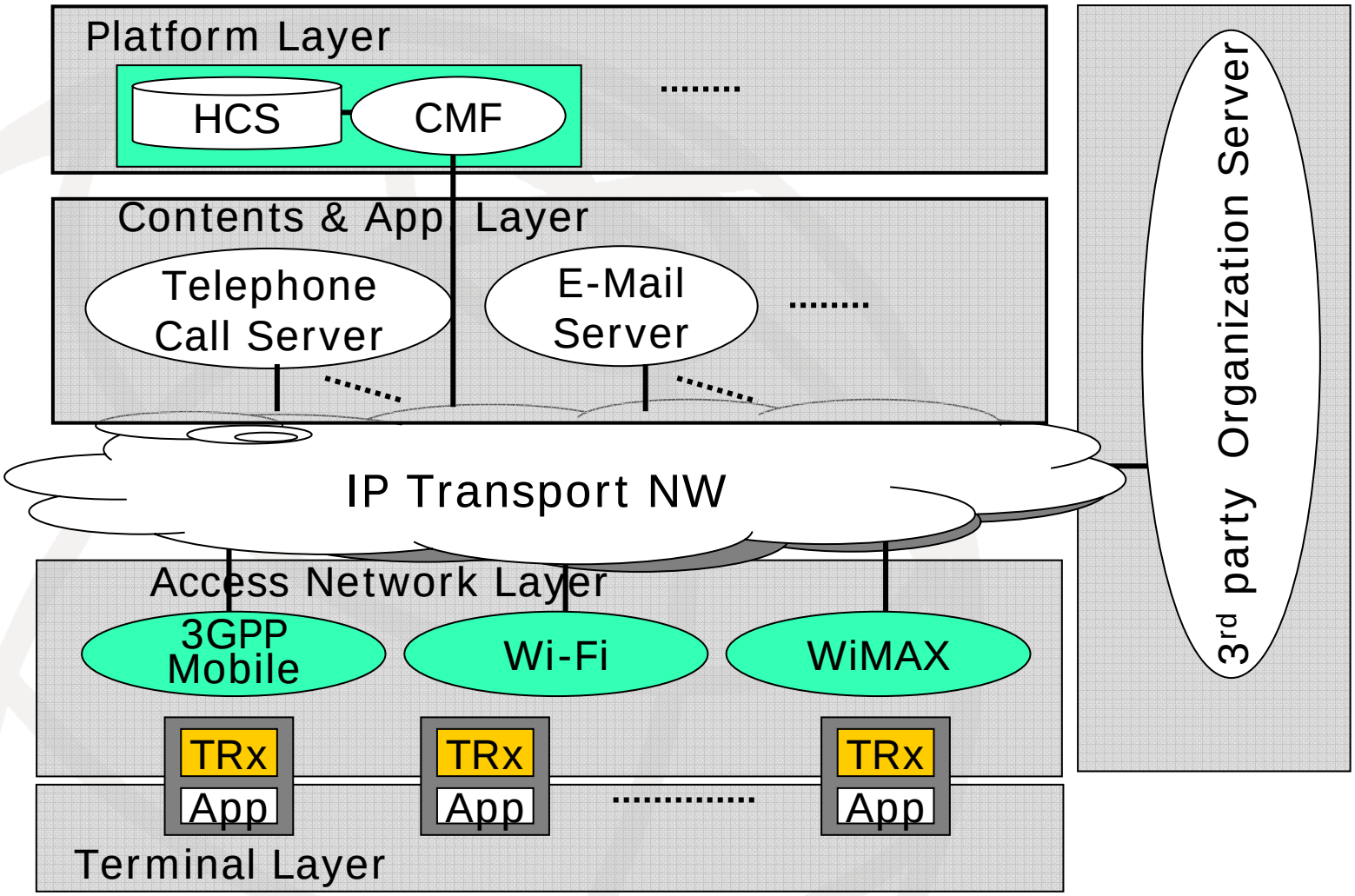


- Ways to realize the 3Fs
  - Appling REST to applications and Mobile-REST to control procedures
  - Commonly using same user address for person to person communication services
  - New architecture which has no IMS, no S/I/P-CSCF

Open Heterogeneous Mobile Network



Architecture of the NGN based on REST



*HCS: Home Consumer Server

*CMF: Charging Management Function

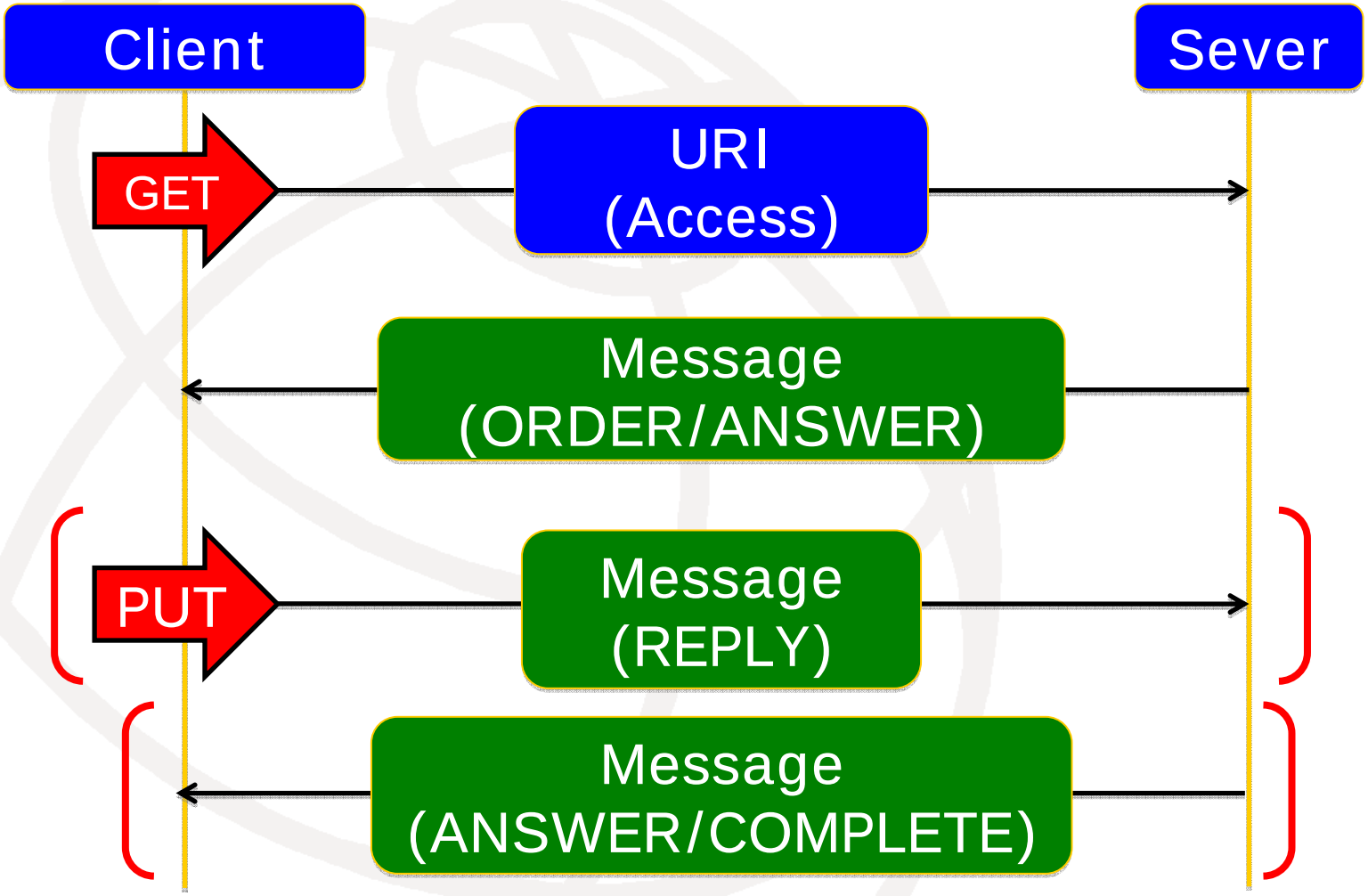
What are REST and Mobile-REST?

- REST (Representational State Transfer)
  - One of ways to develop Web service
  - R. T. Fielding proposed
    - Client-server
    - Stateless
    - Cache
    - Uniform interface
    - Layered system
    - Code-on demand
- Mobile-REST
  - REST concept applies to Mobile communication protocol.

Mobile-REST –Superior points-

- Control sequences are uniformed.
- A client just obeys a server.--→ Client programs will be uniformed such as Web browser.
- HTTP/HTTPS is available to use as a transmission protocol.
- Web server is available to use as a multi-access server. --→ Cost of a network server will dramatically decrease.
- Because communication messages are described in XML, it is easy to pick up request commands from each message by XML parser.
- As it is possible to monitor communication messages by Web browser, debug becomes very smooth.

Mobile-REST -Control sequence-



Mobile-REST –Message name-

- ORDER (Server -→ Client)
  ; A server orders a client what to send.
- REPLY (Server <--- Client)
  ; A client sends data to reply the above ORDER message.
- ANSWER (Server -→ Client)
  ; A server provides a client data.
- COMPLETE (Server -→ Client)
  ; A server informs a client what this process has been completed.

Mobile-REST –Message form-

```
<?xml version="1.0"encoding="UTF-8"?>
<document>
  <schema>Message name</schema>
     <Group name>
        <Data name 1>unit or data</Data name 1>
                - - - - -
        <Data name n>unit or data</Data name n>
     </Group name>
</document>
```

Mobile-REST –Example of message-

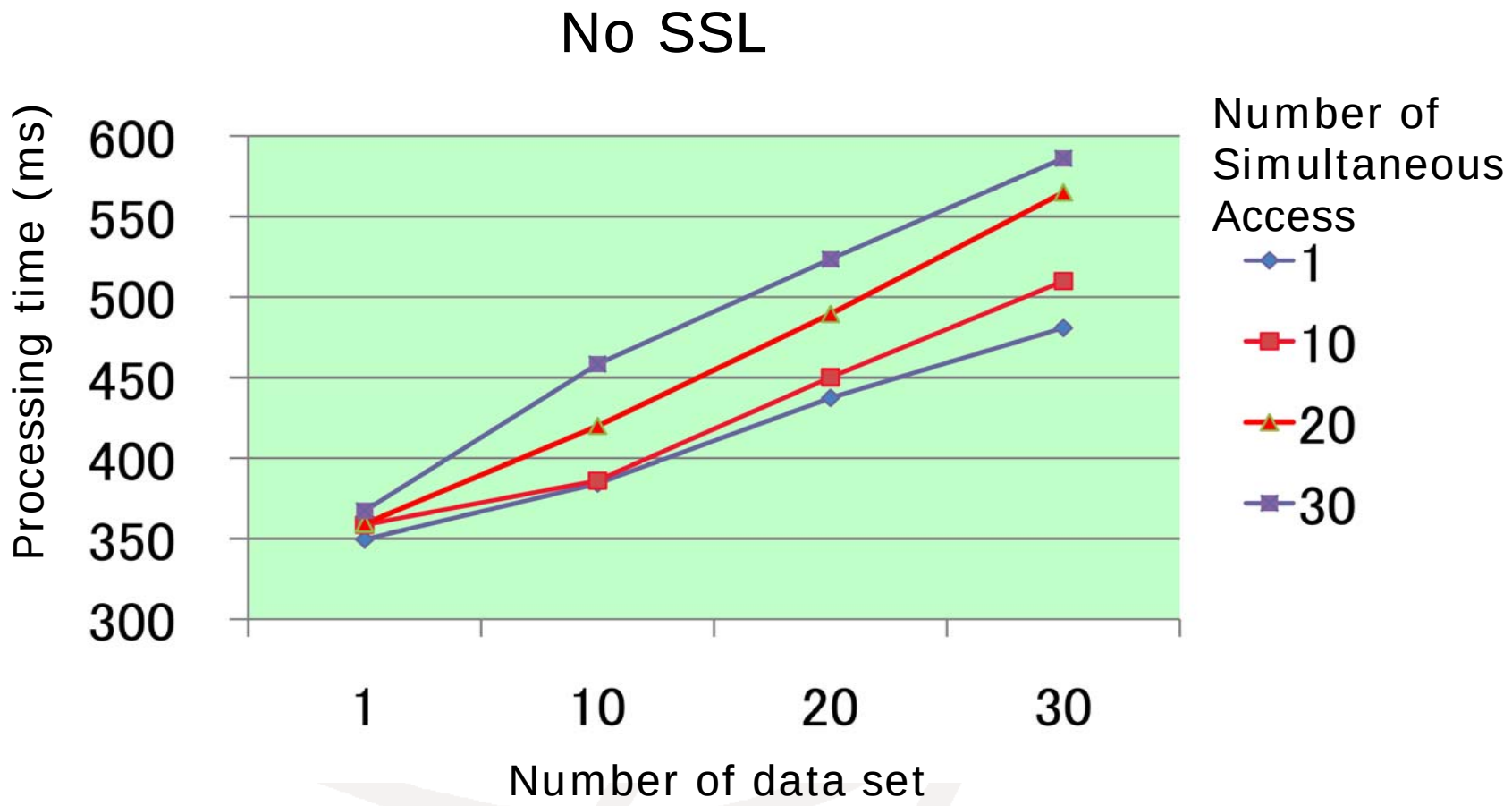
```
<?xml version="1.0" encoding="UTF-8"?>
<document>
  <schema>ORDER</schema>
  <base station data>
    <receiving time>date</receiving time>
    <terminal_id>mac-address</terminal_id>
    <ssid>text</ssid>
    <rssi>dbm</rssi>
  </ base station data>
</document>
```

Mobile-REST –Processing ability-

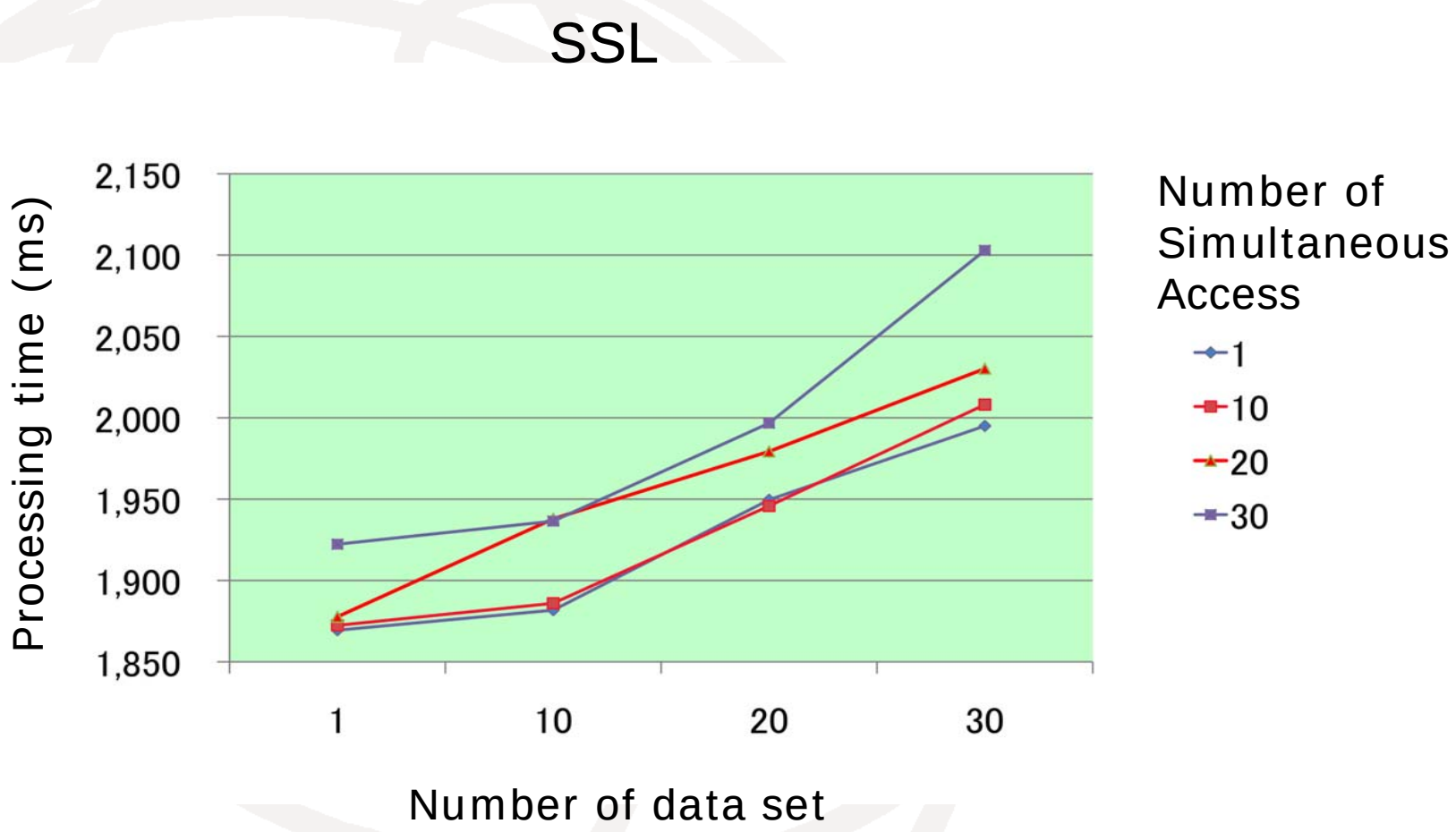
Measurement system

	Client	Server
CPU	UltraSPARC-Ⅱe 550MHz	Core 2 Duo E8500 @3.16GHz
OS	SunOS Release 5.9 64bit	Windows XP Professional ServicePack3 32bit
RAM	512MB	3GB
JAVA	1.4.2_05	1.6.0_14

Mobile-REST –Processing ability-



Mobile-REST –Processing ability-



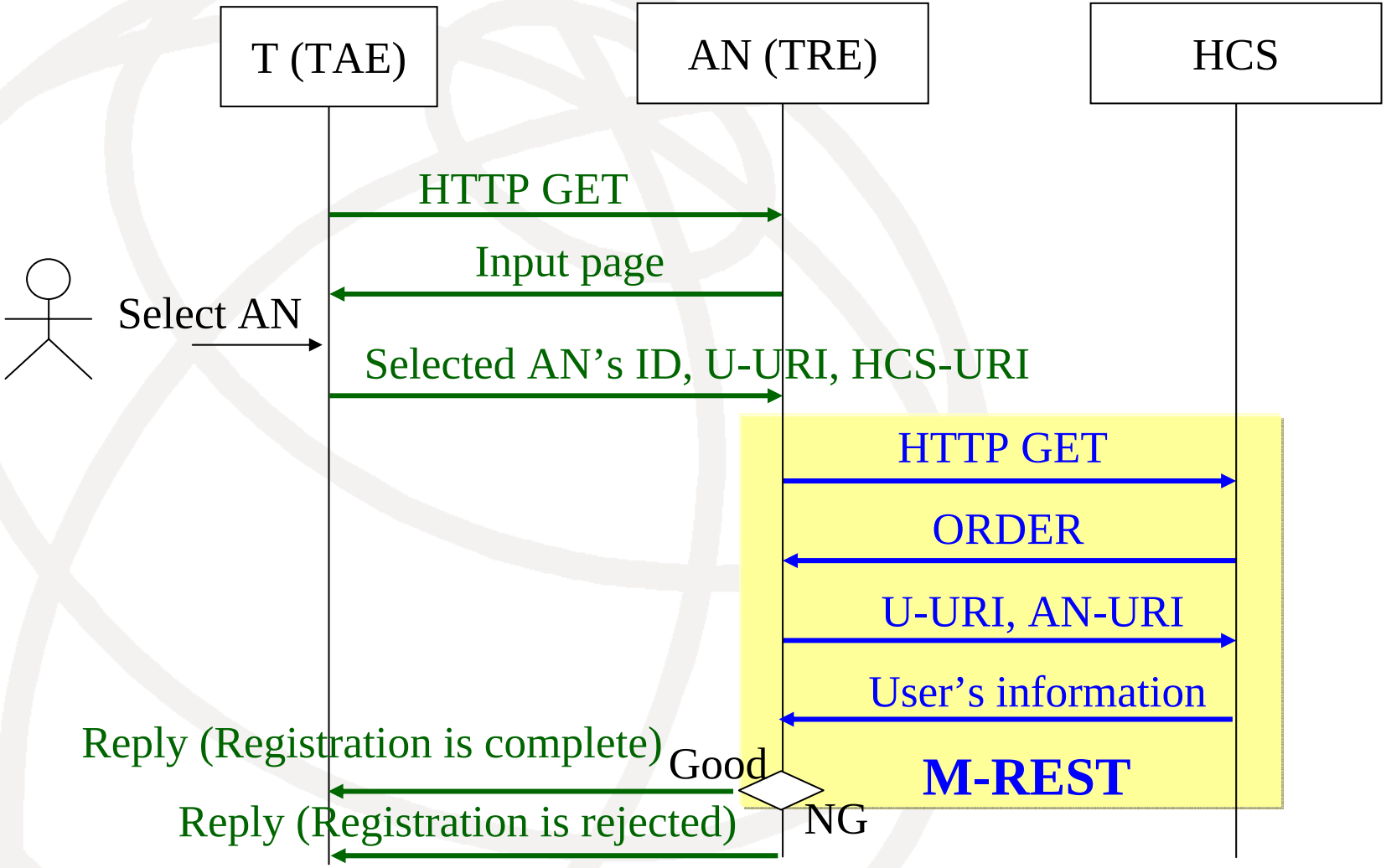
Address system of P2P services

- **NGN add.**
  - **Public User Identity (IMPU)**
    - sip:username@ims-operator.com
    - tel:+81-19-694-2616
  - **Private User Identity (IMPI)**
    - username@ims-operator.com

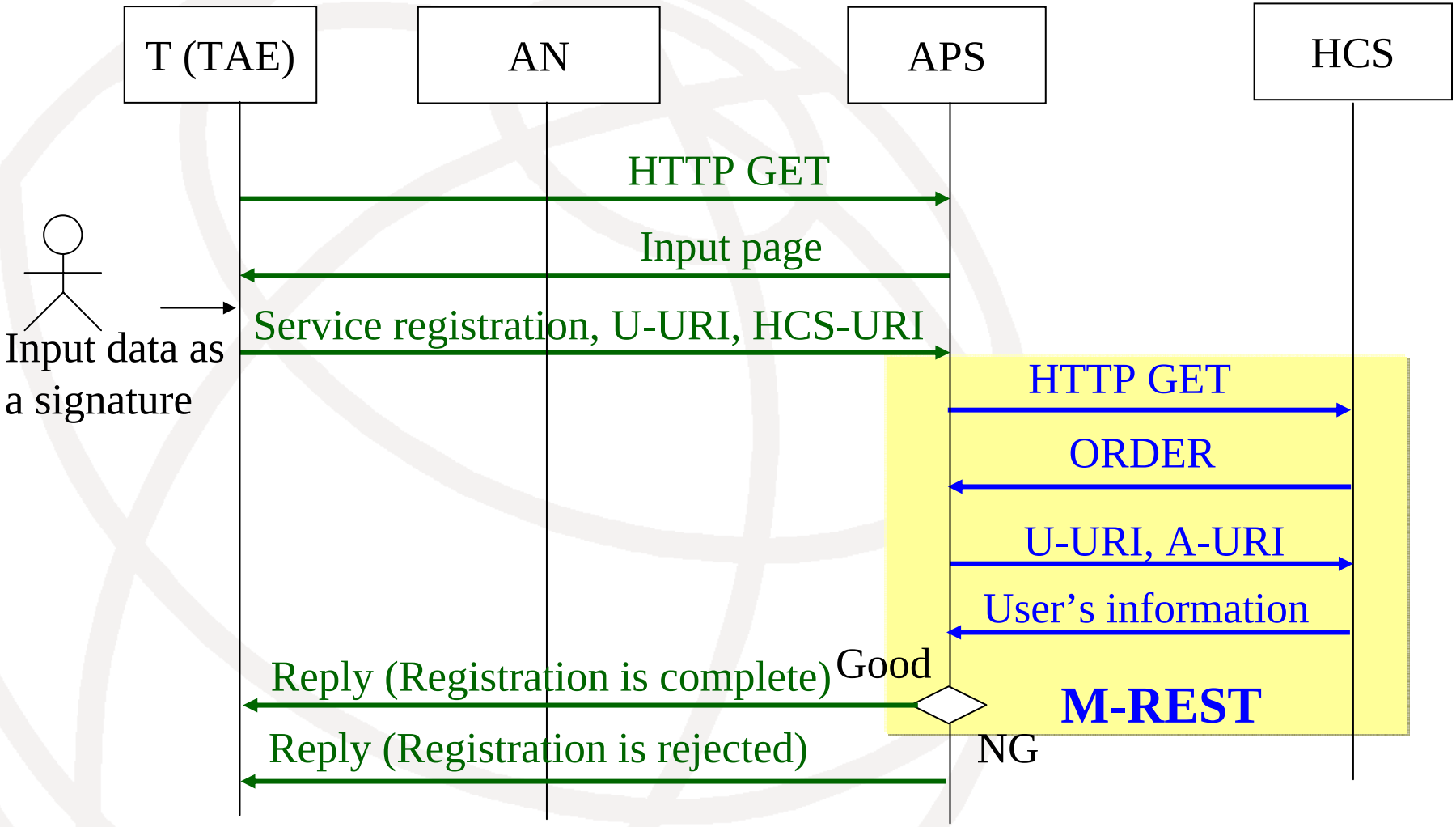
- **Proposed add: U-URI [rma] HCS-URI**
  - U-URI: User's URI is assigned from a platform business player; and is unique in the world. This will be supplied by the consumer identity module (CIM) card.
  - HCS-URI: URI of HCS that belongs to a platform service provider.
  - [rma]: Separator

Control Sequence

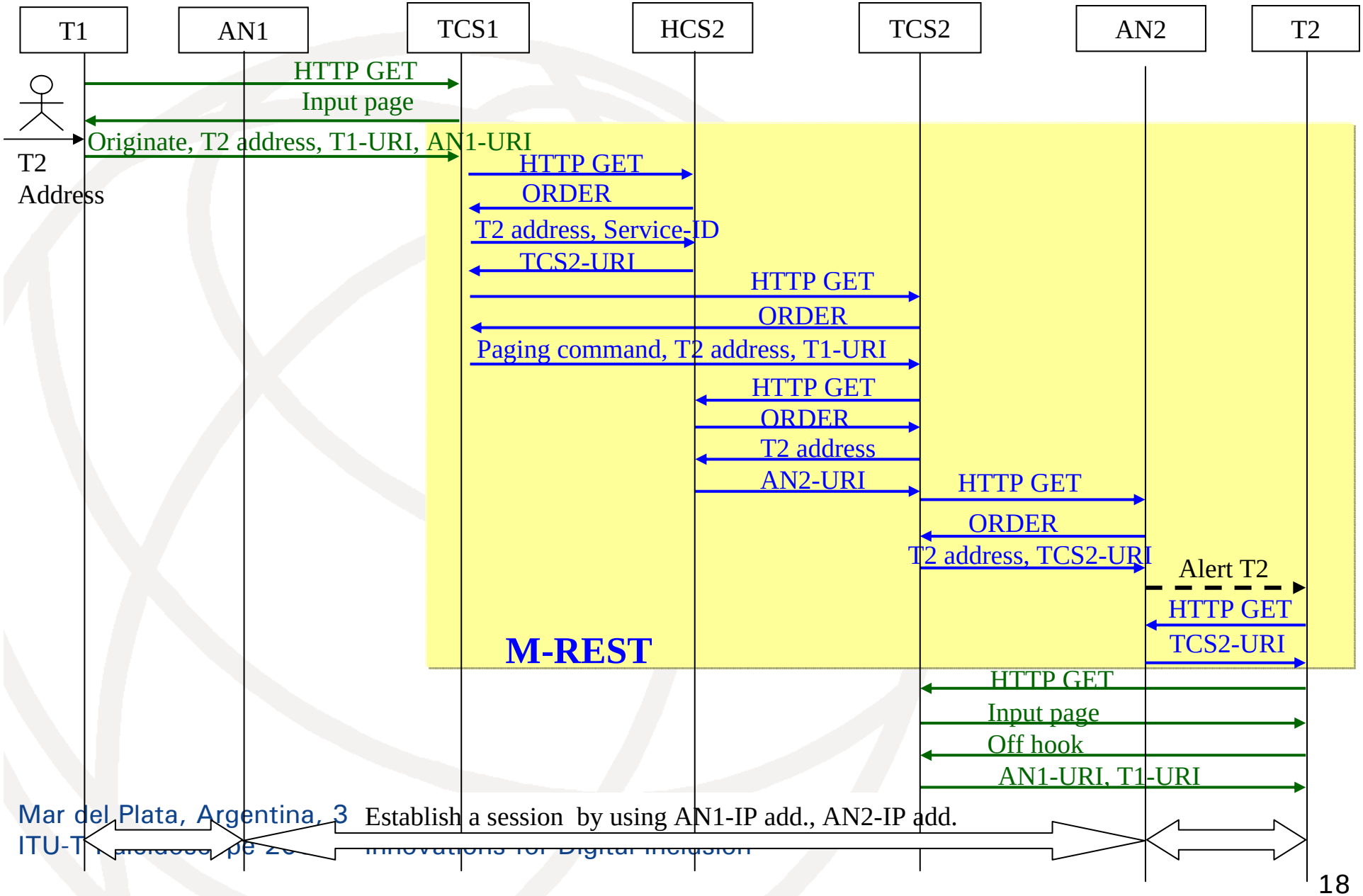
-Access network registration-



Control sequence
-Application registration-



Control sequence -Telephone call service-



Effects for mobile market

- Telephone call service providers
  - The exchange business will change into one of application services. They will shift their business to platform business and/or application business.
  - Most of existing cellular phone carriers will be likely to lose much traffic. But, as total traffic of the market will increase so much, in same case, their traffic will increase.
- Application service providers
  - They will freely provide many Web application.
- Mobile phone manufacturers
  - They will not need to develop any application programs. -->They will be able to concentrate on designing and developing hardware.
- **User**
  - They can freely select favorite business players and mobile terminals in each layer.

Conclusion

- The new mobile-NGN architecture based on REST concept is proposed.
  - Appling REST for applications and Mobile-REST for a standard protocol
  - Commonly using same user address for person to person communication services
  - New architecture which has no IMS, no S/I/P-CSCF
- This architecture must change the mobile communication market.
- As the result of hard competition, innovative applications will be created; and the market will continuously grow.