NTT docomo

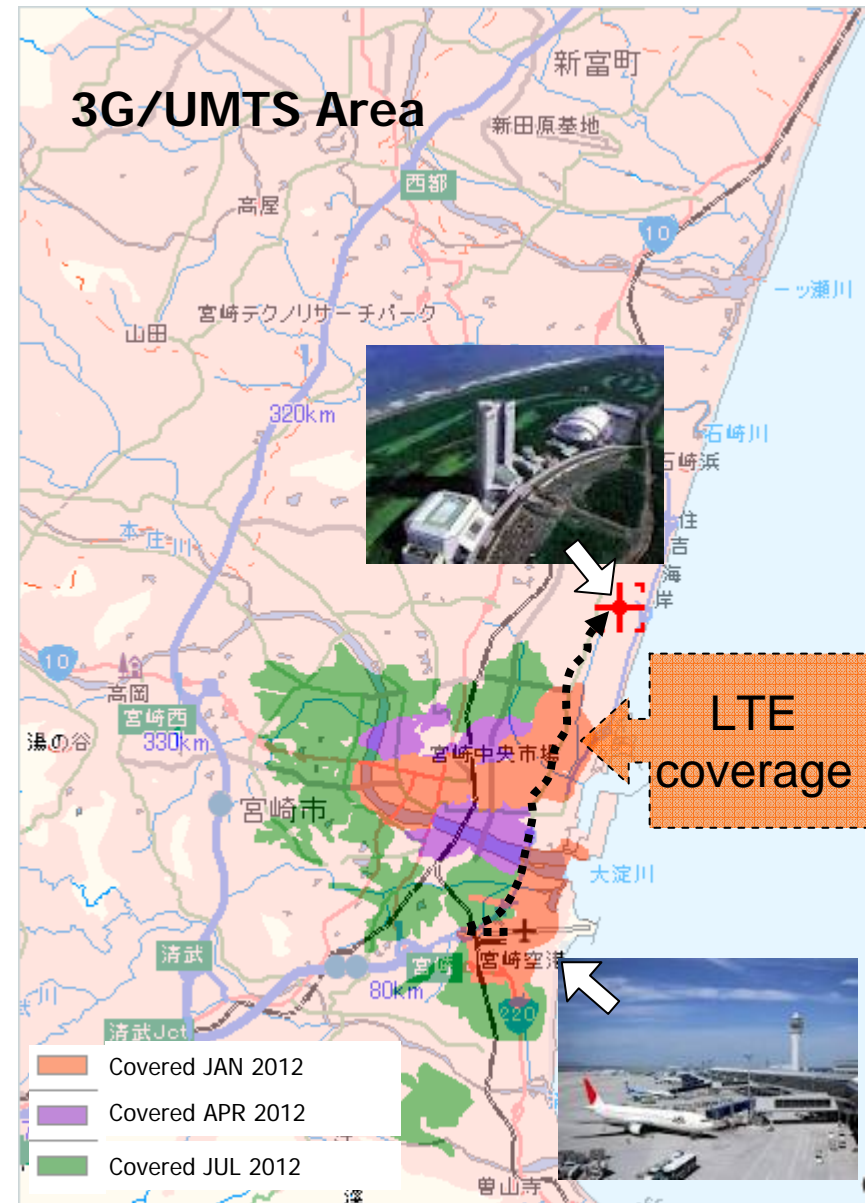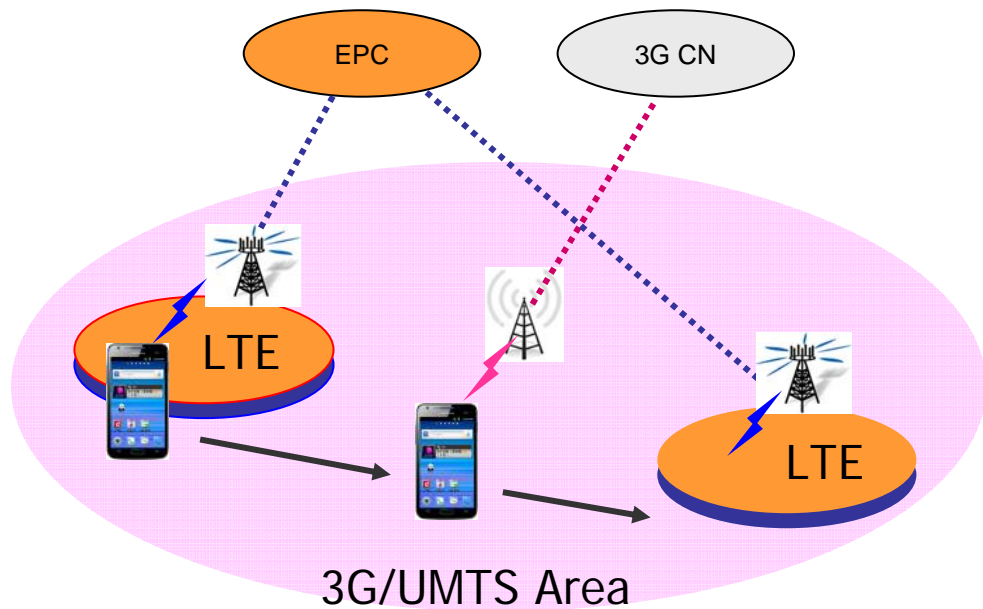# Improvement of VoLTE Domain HO with Operators Vision

NW Strategy Group, Global Standardization Team

Network Development Department

NTT DOCOMO R&D Center

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2012/03/06

WTC 2012 @ Miyazaki

Motivation of the Work (eSRVCC)
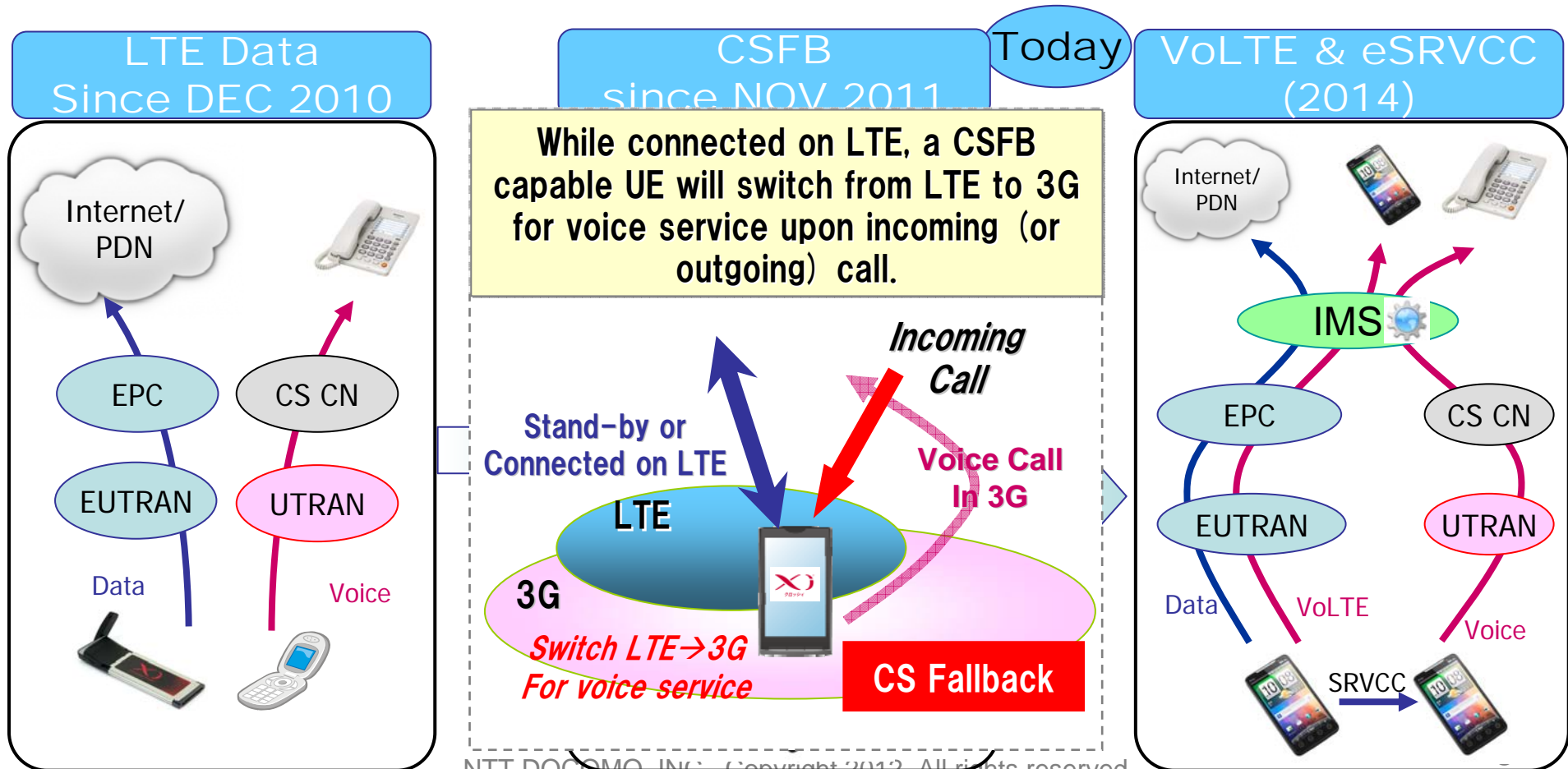
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This slides primary explains an improvement scheme of SRVCC Domain HO (eSRVCC)

Single Radio VCC (SRVCC) is an essential technology for Voice Domain HO (Between CS and EPC domain)

EPC

3G CN

LTE

LTE

3G/UMTS Area

3G/UMTS Area

LTE coverage

Covered JAN 2012
Covered APR 2012
Covered JUL 2012

VoLTE (Voice Over LTE) Migration Scenario NTT docomo

- **LTE Data only => Voice with CSFB => VoLTE (eSRVCC)**
- **eSRVCC shall be mandatory applied in roaming & interworking scenario based on GSMA_IREG specification.**
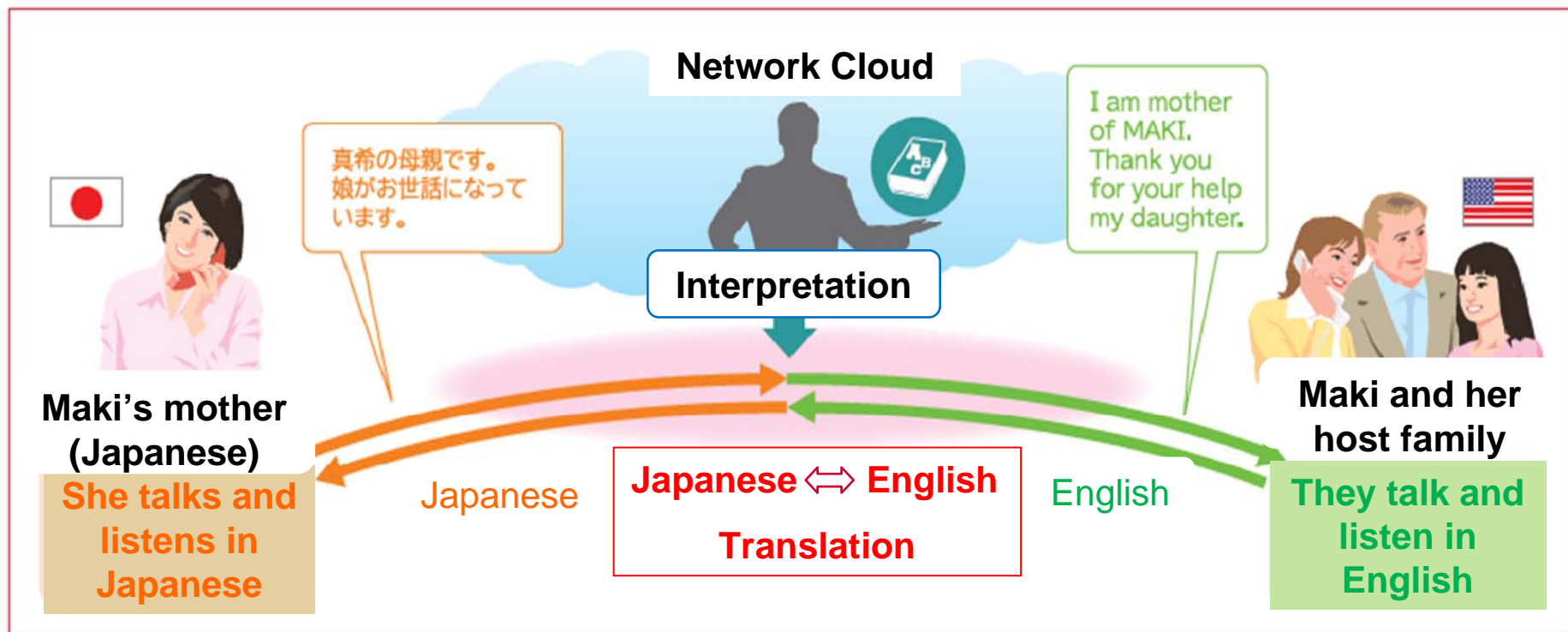- **UE can be normal SRVCC terminal, eSRVCC only upgrade the NW.**

LTE Data Since DEC 2010

Internet/ PDN

EPC

CS CN

EUTRAN

UTRAN

Data

Voice

CSFB since NOV 2011

Today

While connected on LTE, a CSFB capable UE will switch from LTE to 3G for voice service upon incoming（or outgoing）call.

Incoming Call

Stand-by or Connected on LTE

LTE

Voice Call In 3G

3G

Switch LTE→3G For voice service

CS Fallback

VoLTE & eSRVCC (2014)

Internet/ PDN

IMS

EPC

CS CN

EUTRAN

UTRAN

Data

VoLTE

Voice

SRVCC

OTT VoIP and VoLTE

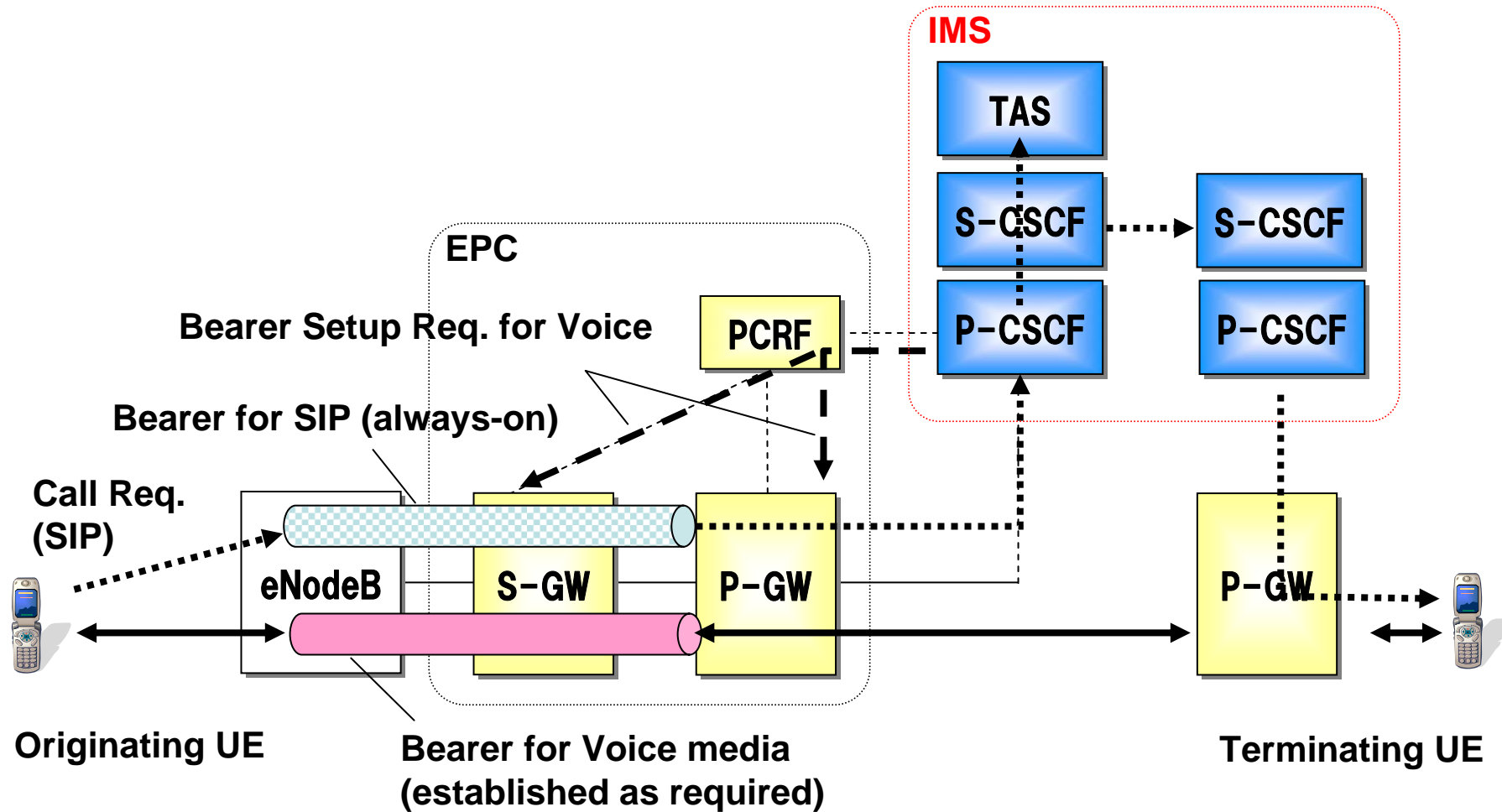|	OTT VoIP	VoLTE
Treated as	A Data stream	**A Voice Grade Call**
QoS Class	Non-GBR Best Effort data service: QCI = 7	**High quality GBR: QCI=1 Conversational Voice**
Emergency Call	NO	**YES**
Service Set	NO Stand alone voice	**Service Orchestration** **Operator provides a set of service.**
Infrastructure support	Treated as a data stream (in LTE->3G HO, quality degradation may occur)	**Infrastructure supports the quality. (e.g., SRVCC/eSRVCC)**

The concept of AIPN and SEN
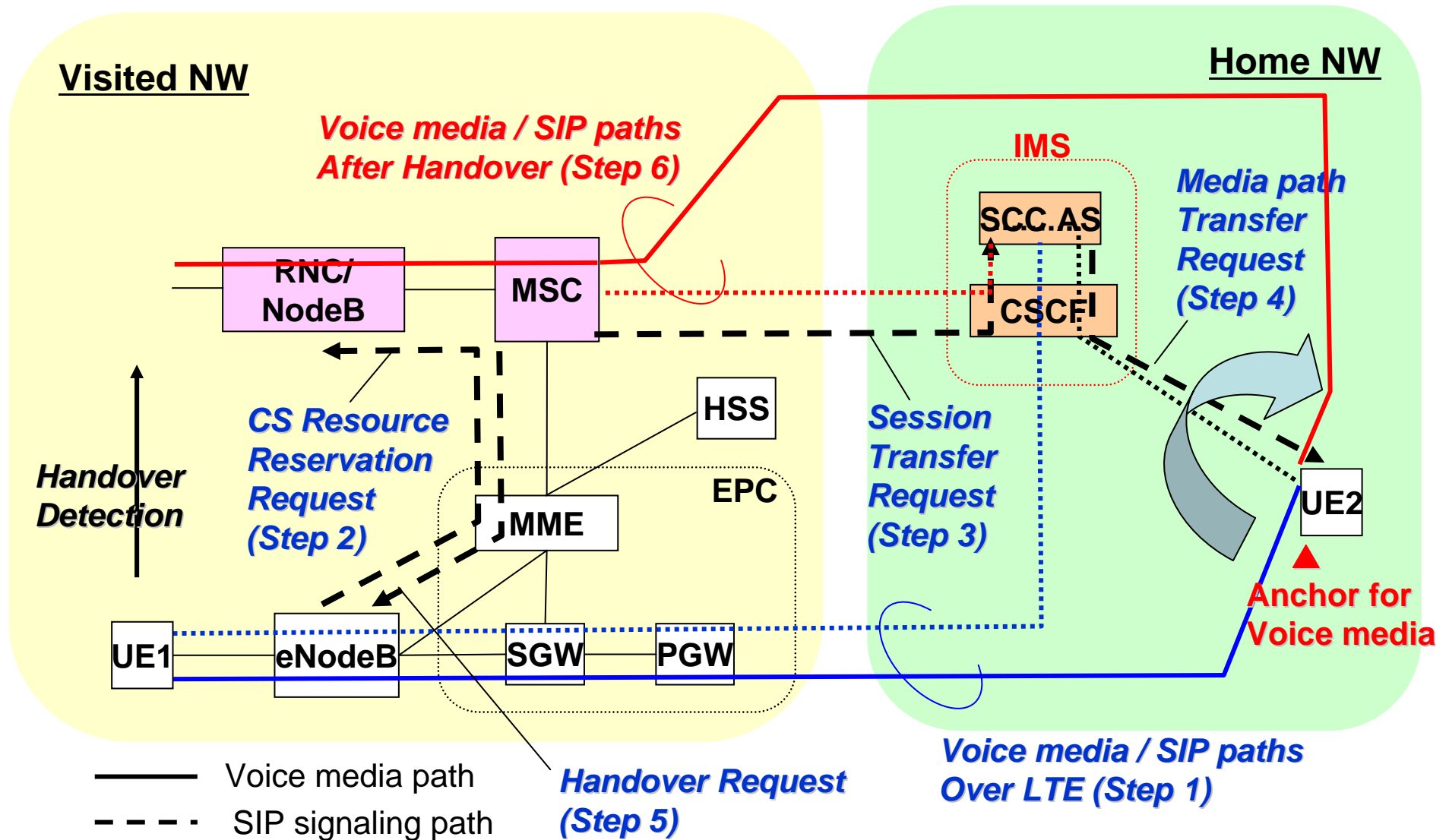
Mobile Simultaneous Interpretation System

A service that automatically translates the language on the one party into the language on the other party during a call in progress.

Network Cloud

真希の母親です。娘がお世話になっています。

I am mother of MAKI. Thank you for your help my daughter.

Interpretation

Maki's mother (Japanese)

She talks and listens in Japanese

Japanese

Japanese ⟺ English Translation

English

Maki and her host family

They talk and listen in English
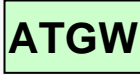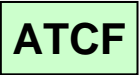
VCC and NW Architecture in VoLTE

IMS

TAS

S-CSCF → S-CSCF

P-CSCF · · · · P-CSCF

EPC

Bearer Setup Req. for Voice

PCRF

Bearer for SIP (always-on)

Call Req. (SIP)

eNodeB — S-GW — P-GW — P-GW

Originating UE

Bearer for Voice media (established as required)

Terminating UE

SRVCC Procedure

SRVCC Drawback and the Improvement

	SRVCC	eSRVCC
U-Plane (Voice Media) Anchor point	Locates at Home NW UE2 **Anchor for Voice media**	**Locates at Visited NW (ATGW Anchors it)** ATGW **Anchor for Voice media**
C-Plane Anchor point	Also locate at Home IMS IMS SCC AS	**Locates at Visited NW (ATCF Intercepts it)** ATCF
HO Signaling Path	Have to travel to the Home NW, always.	**Visited NW only**
Because	In principle, IMS controls in the Home NW,	**eSRVCC improved the drawbacks**

Enhanced SRVCC
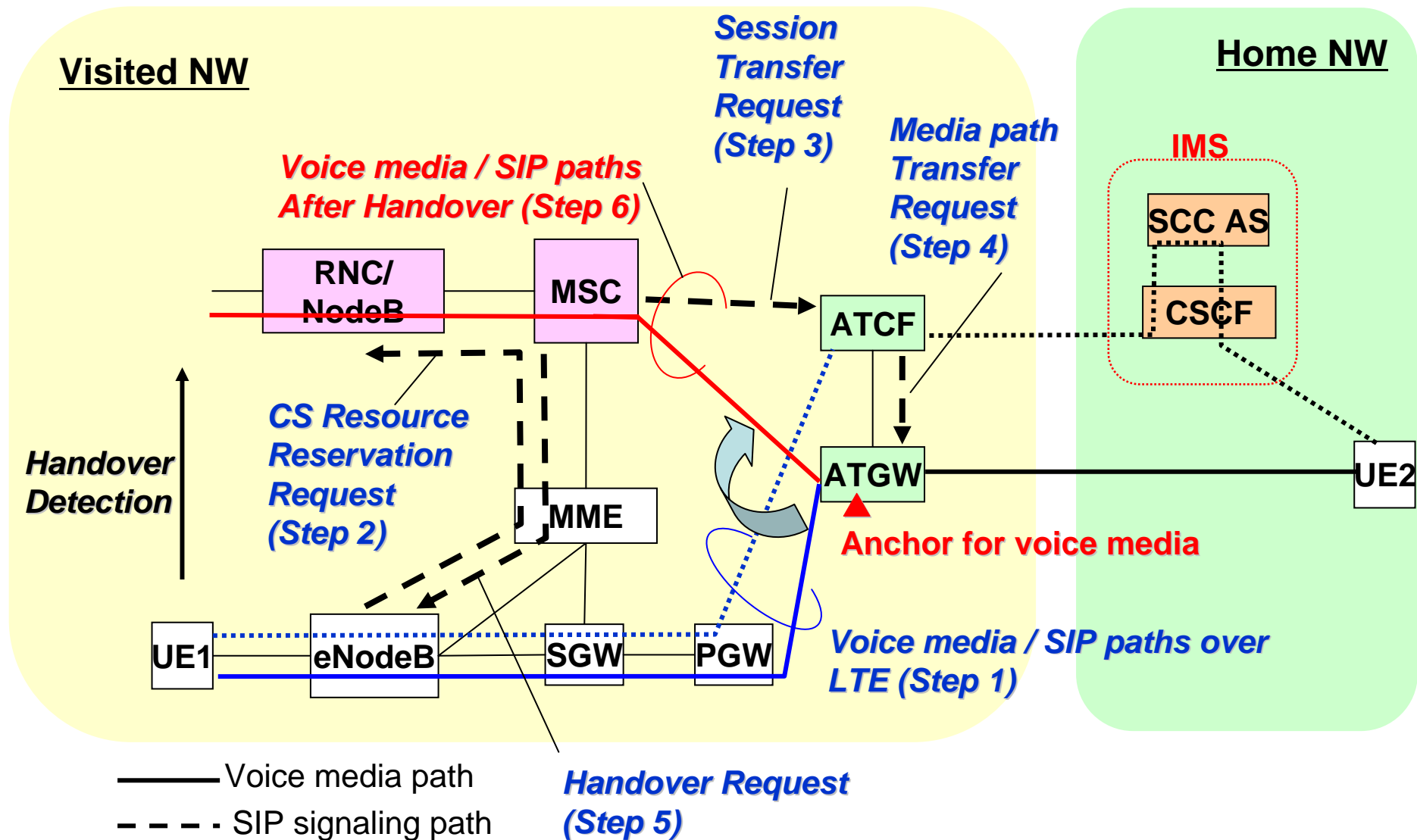
Performance Improvement SRVCC to eSRVCC **OMO**

Participants (columns): UE, Source E-UTRAN, Source MME, MSC Server/MGW, Target MSC, Target SGSN, Target BSS, SGW, IMS (SCC AS)

1. Measurement reports
2. Decision for HO
3. Handover Required
4. Bearer Splitting
5. PS to CS Req
6. Prep HO Req
7. HO Request/Ack
8. Prep HO Resp
9. Establish circuit
10. Initiation of Session Transfer (STN-SR)
11. Session transfer and Update remote end
12. Release of IMS access leg
13. PS to CS Resp
14. Handover Command
15. HO from EUTRAN command
16. UE tunes to UTRAN
17. HO Detection
18. Update Bearer
19. HO Complete
20. SES (HO Complete)
21. ANSWER
22. CS to PS Complete/Ack
23. UpdateLoc — HSS/HLR

Delay Factor #1

Radio Access Update

Major Delay Factor

Delay Factor #2
IMS Remote Leg Update & Session Transfer

1-2 hundreds of ms*

Not a critical latency

In a roaming case, potential of 1/2 sec or more in SRVCC.

eSRVCC reduced it to negligible one

Conclusion & Way Forward

This Presentation Explained

- **The needs of eSRVCC with DOCOMO's NW Migration Plan**
  - LTE radio coverage are limited, not full covered yet.
- **Infrastructure Sustain Voice Quality in Domain HO**
  - SRVCC and eSRVCC
- **We provides various service set + the SEN-Platform**
  - OTT VoIP (single service) v.s. Service Set
- **Mechanism of VoLTE and SRVCC**
  - Basic Mechanism Explained
- **Improved Scheme of eSRVCC**
  - ATGW/ATCF locates at Visited NW
  - And eSRVCC is mandatory used as in GSMA_IREG spec.

Thank you for listening

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docomo **NEXT** series

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brings more fun to life**

**Innovative &
broadens your potential**

FY2011 winter-spring models

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