CDMA2000 1x Deployment and Associated Multimedia Services Launched in Japan

KDDI Corporation

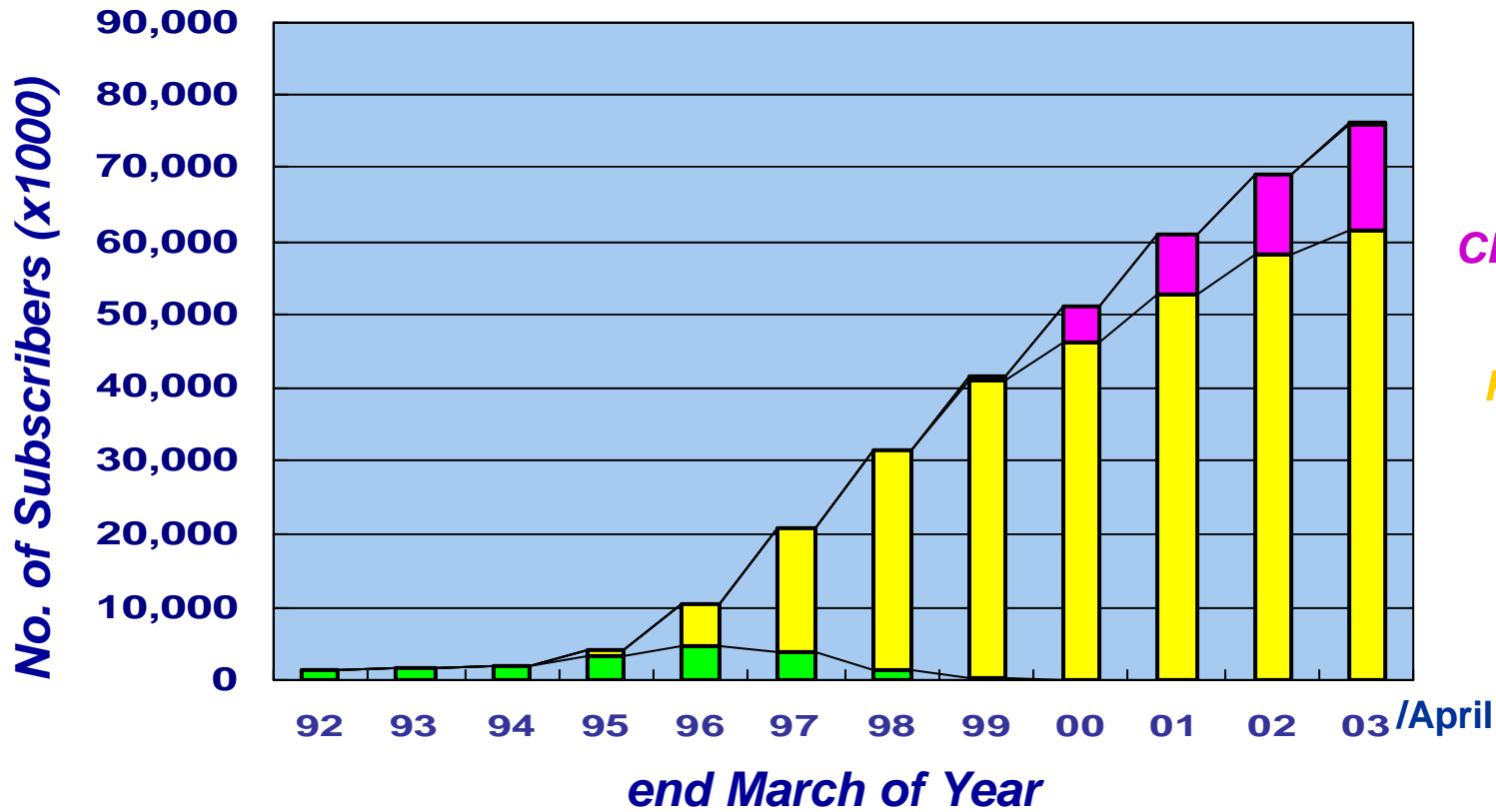# *Cellular Market Outlook in Japan : Shifting to Multimedia Gateway*
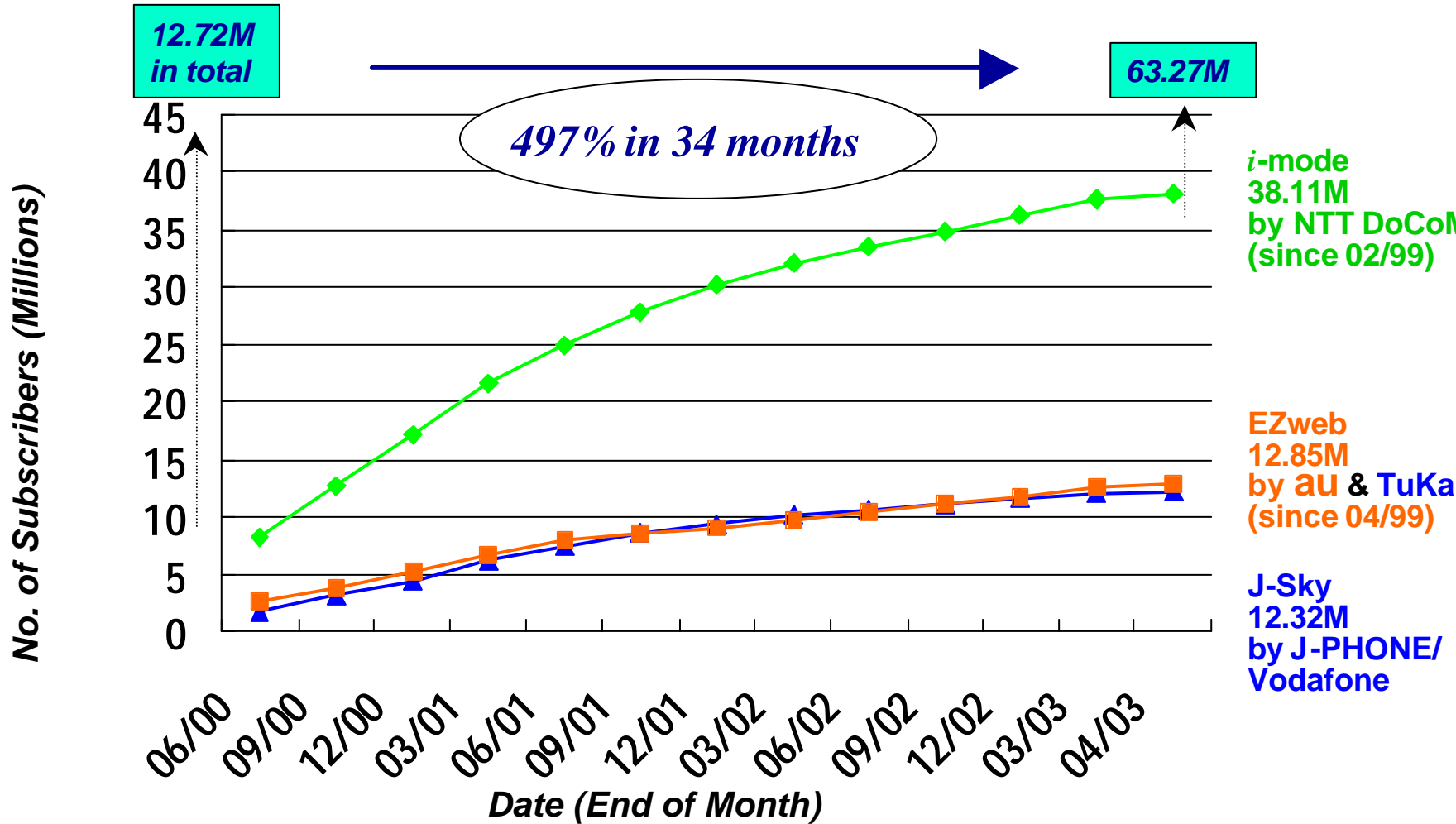
Cellular Subscriber Growth in Japan

No. of Subscribers (x1000)

end March of Year

end April 2003
76,315K

W-CDMA
456K

cdmaOne/
CDMA2000 1x
14,298K

PDC (TDMA)
61,561K

- W-CDMA
- cdmaOne/CDMA2000 1x
- PDC
- Analog

Mobile Internet Subscriber Growth

12.72M in total

497% in 34 months

63.27M

No. of Subscribers (Millions)

i-mode
38.11M
by NTT DoCoMo
(since 02/99)

EZweb
12.85M
by au & TuKa
(since 04/99)

J-Sky
12.32M
by J-PHONE/
Vodafone

Date (End of Month)

Note: The number of subscribers for EZweb or i-mode is counted based on the paid contract, while that for J-Sky represents number of browser enabled phones.
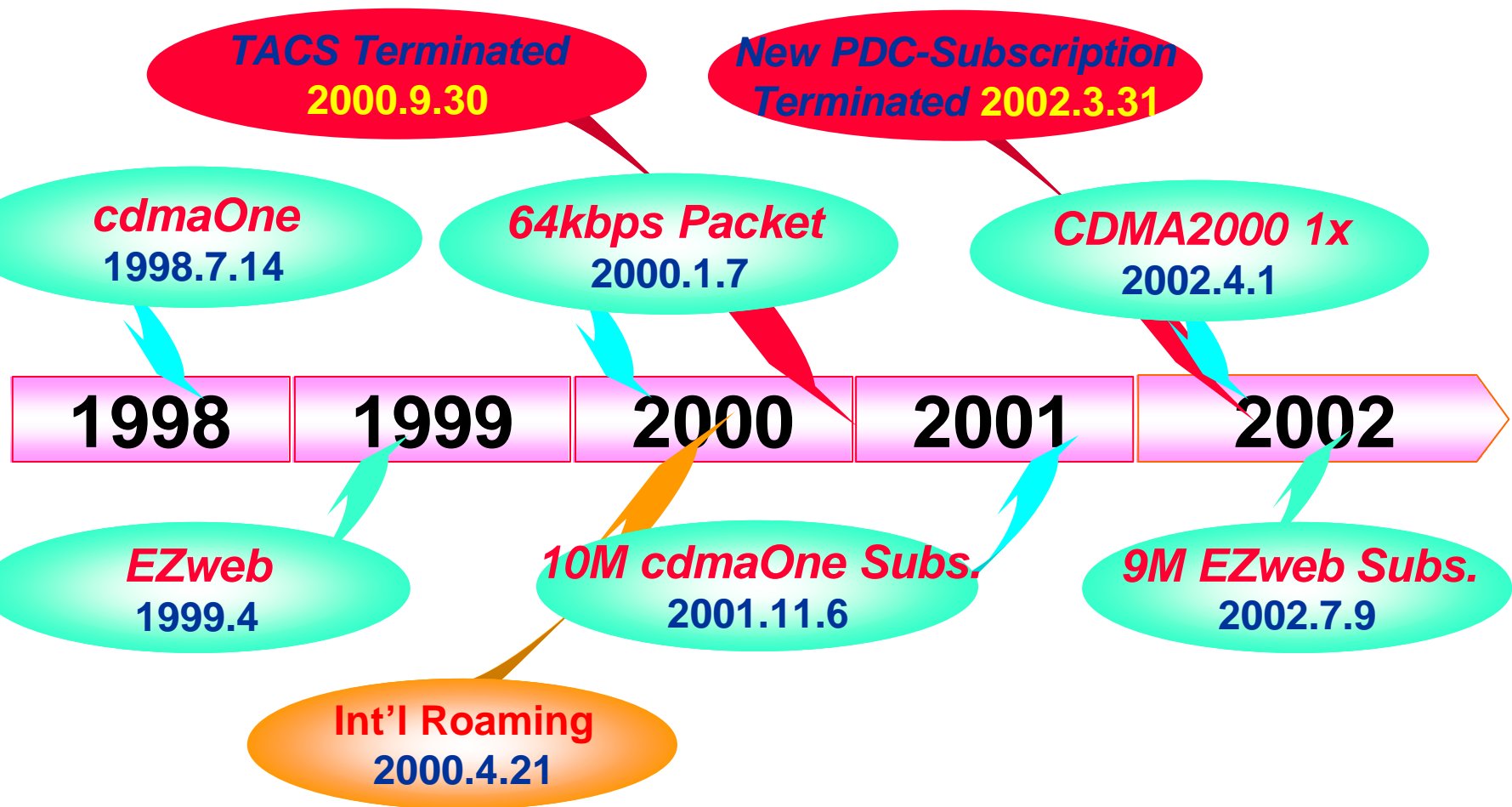
CDMA2000 1x Launch by au
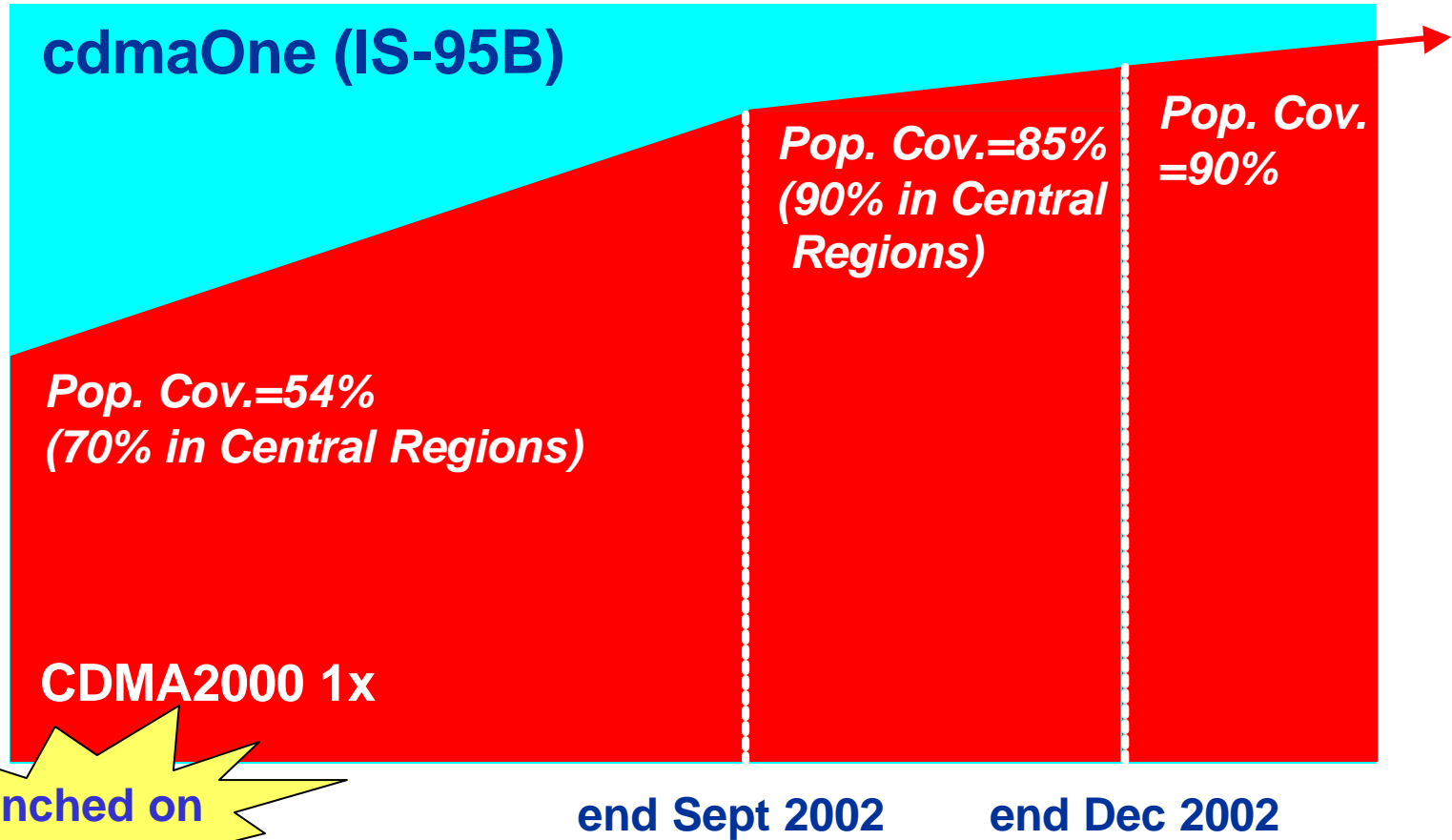
("au" is the brand of KDDI's cellular service.)

History of *au* : towards Multi-media Era

TACS Terminated
2000.9.30

New PDC-Subscription
Terminated 2002.3.31

cdmaOne
1998.7.14

64kbps Packet
2000.1.7

CDMA2000 1x
2002.4.1

1998	1999	2000	2001	2002

EZweb
1999.4

10M cdmaOne Subs.
2001.11.6

9M EZweb Subs.
2002.7.9

Int'l Roaming
2000.4.21

Rapid CDMA2000 1x Rollout by **au**

Population Coverage 99.9%

cdmaOne (IS-95B)

**Pop. Cov.=85%
(90% in Central
Regions)**

**Pop. Cov.
=90%**

**Pop. Cov.=54%
(70% in Central Regions)**

CDMA2000 1x

**Launched on
1st Apr 2002**

end Sept 2002

end Dec 2002

3G Subscriber Growth in Japan

The number of CDMA2000 1x subscribers reached 7 million on 8th April.

3G Total at end April 2003
7,966,900

CDMA2000 1x
7,511,000

W-CDMA
455,900

No. of Subscribers

8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0

01/10 01/12 02/2 02/4 02/6 02/8 02/10 02/12 03/2 03/4

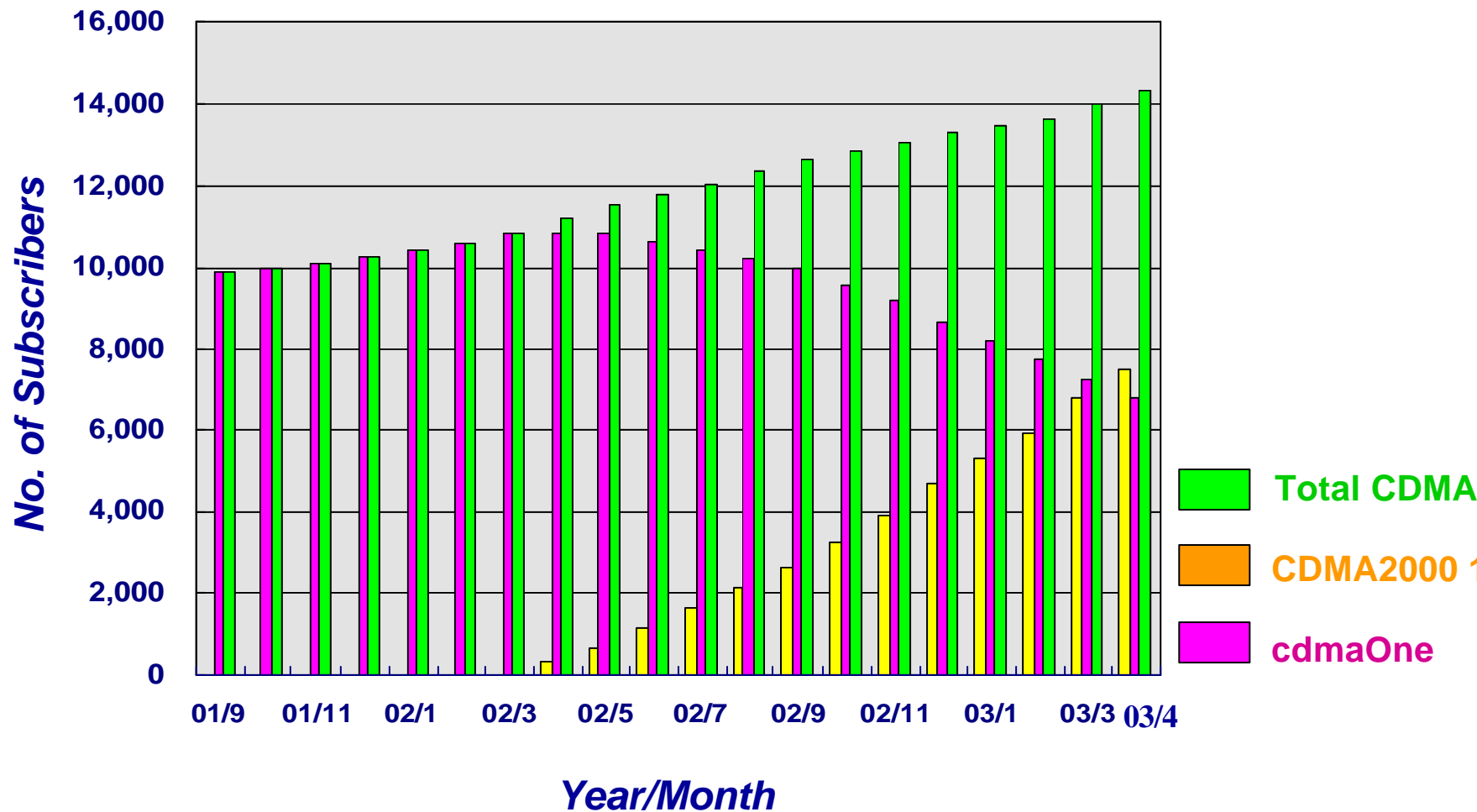Year/Month

CDMA2000 1x
W-CDMA

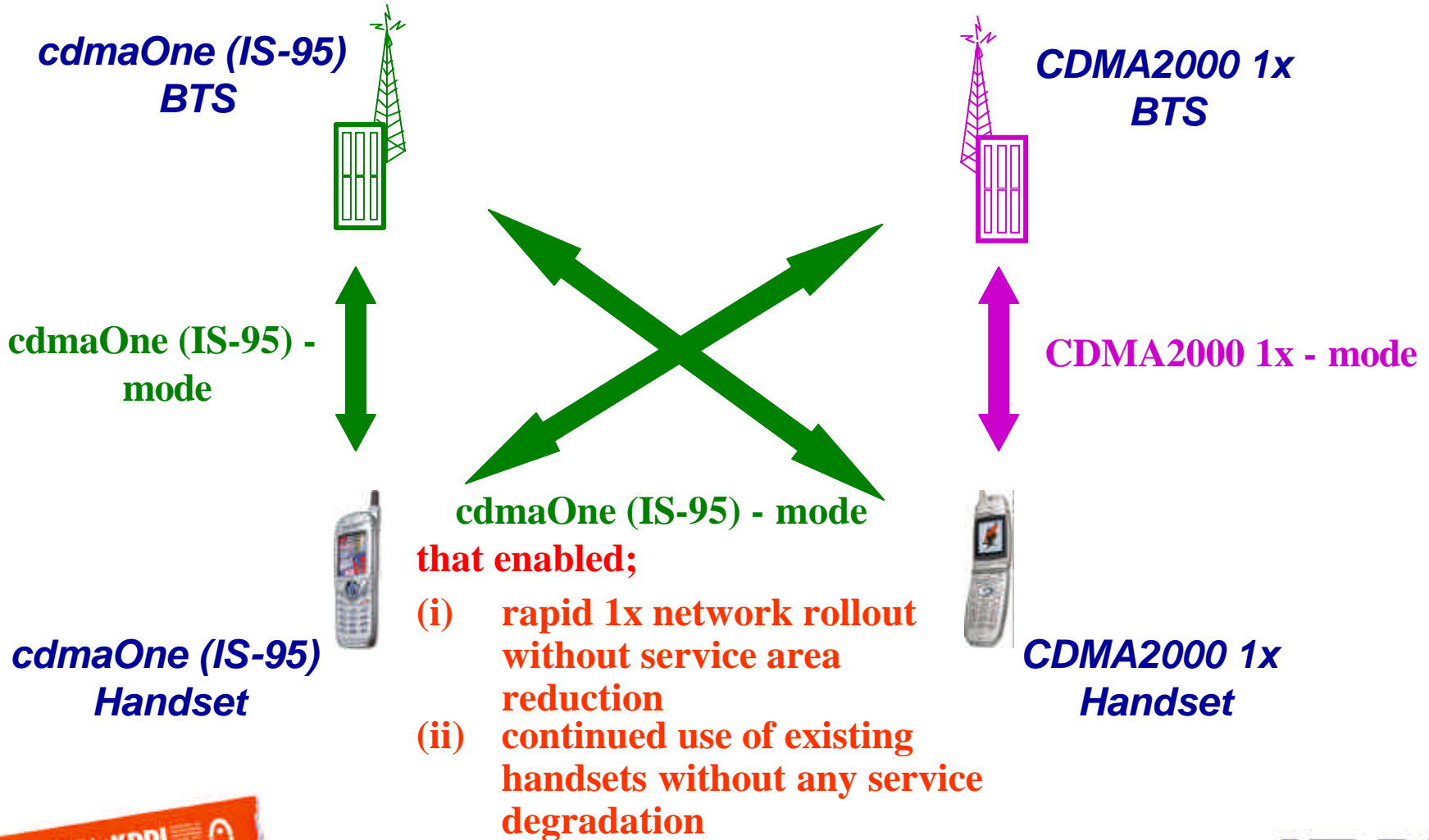# 3G Penetration in *au*'s Subscriber

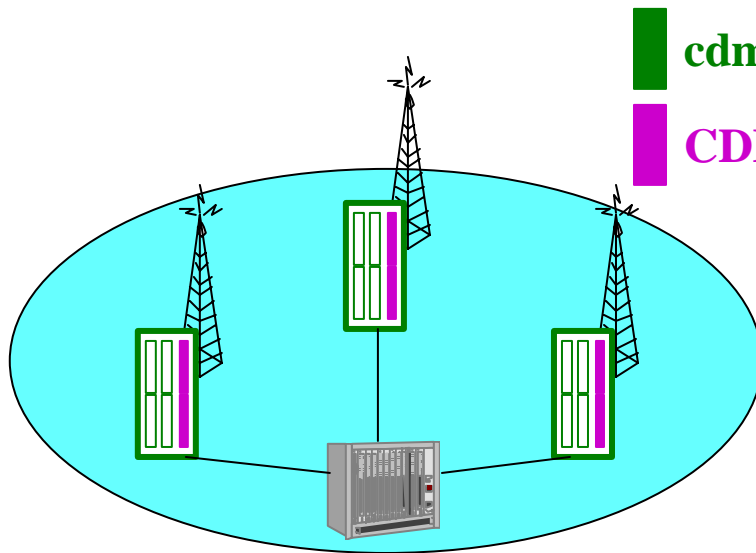# *Secret of au's Success in CDMA2000 1x Launch*

Technology Led to Success

✓ ***CDMA2000 1x's inherent backward compatibility to IS-95,*** **Service coverage was virtually equivalent to the existing cdmaOne service area from Day One**

✓ ***Existing equipment upgrade path,*** **enabled rapid roll-out with low cost**

✓ ***Technology maturity inherited from cdmaOne,*** **led to;**

- **No increase in handset physical dimensions**

- **No degradation in handset battery life time**

- **Same operational stability as cdmaOne**

- **Minimal increase in handset cost**

CDMA2000 1x Advantage:
Backward Compatibility with cdmaOne (IS-95)

cdmaOne (IS-95) BTS

CDMA2000 1x BTS

cdmaOne (IS-95) - mode

CDMA2000 1x - mode

cdmaOne (IS-95) - mode that enabled;

(i) rapid 1x network rollout without service area reduction

(ii) continued use of existing handsets without any service degradation

cdmaOne (IS-95) Handset

CDMA2000 1x Handset

Upgrading-approach vs. Overlaid-approach for CDMA2000 1x Network Rollout
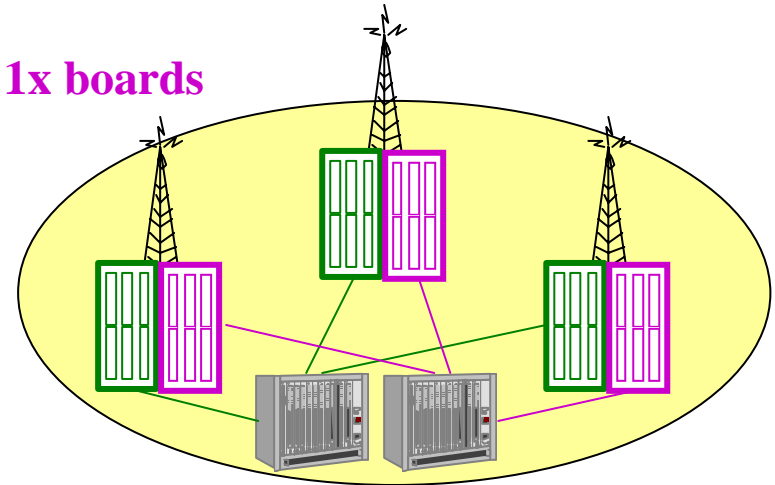
■ cdmaOne boards

■ CDMA2000 1x boards

cdmaOne RAN Upgrade

Pros: less CAPEX needed

Cons: modification may be required in the current cdmaOne software, causing service interruption risk

Overlaid CDMA2000 1x Rollout

Pros: no essential modification required in the current cdmaOne software, causing less risk

Cons: more CAPEX needed

KDDI had adopted Upgrading-approach.

Multimedia Services by au

au's Mobile Multimedia Services

eznavigation

- **More accurate location-based services** powered by **gpsOne**
- **Many new contents associated with ezplus**

ezplus

- **Java**™ application services
- support of **Mobile agent** function using **HTTP**
- **Automatic application update from servers**

ezmovie

- **Video Distribution** (available nationwide from Day One)
- using **Industry Standards**, i.e. **MPEG-4** for video coding and **MP4** for video file format

EZweb@mail – *IMAP4-based e-mail platform*

EZweb – *WAP2.0-based Internet Access and Browsing Platform*

Movie-mail

15 sec max recording

96x80 dpf

Smooth movie at 7.5 fps max

Capable of dubbing

Capable of text superposition

Capable of location advice indicated on a map using GPS

Capable of movie exchange with PCs

Movie-mail Terminal

- **Movie-mail capable**
- **Photo-mail capable**
- **CoCo-SECOM EZ capable**

- **310,000-pixel CCD camera**
- **SD Memory Card for video/picture file storage**
- **260,000-color TFT display**
- **40-chord melody ring**

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Photo-mail

Take a picture anytime, Anywhere.

Send the picture by e-mail as an attachment.

PNG, JPEG or GIF format available

Location of the spot can also be advised using eznaviagtion-feature, which can b reproduced in a map format on the recipient side.

撮ったらすぐ送信！

Photo-mail Terminal

- **110,000-pixel CMOS camera**
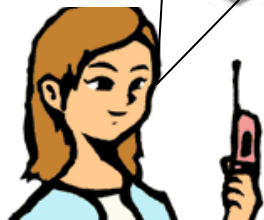- **65,536-color TFT display**
- **40-chord melody ring**

- **110,000-pixel CCD camera**
- **65,536-color TFT display**
- **40-chord melody ring**

GPS Terminal

Ezweb-capable Terminal

(CDMA2000 1x-based)   **(CDMA2000 1x-based)**

eznavigation (GPS Terminal) Associated with Photo-mail

Storing location information with pictures

Restaurants or Shops
to Recommend

Impressed Views
during Travel

Meeting Place

- **easy to advise a recommendable place**
- **recall vividly memory of travel by pictures with location information**
- **and for business applications**

Communications by Photo-mail/GPS Terminal

Determine location

Store location info and take a picture
> *Lovely dishes! Take a picture!*

Send a Mail with picture and location info attached
> *Let's advise her!*

"Hey! I found a nice restaurant!"

Receive the Mail
> *Look nice! Aha! That restaurant!*

Since an URL of map site can be inserted in the text part of e-mail, this combined information can also be received by any EZweb-enabled handsets without camera

Map image is drawn by contents available on Ezweb

Photo-mail/GPS Terminal

- **110,000-pixel CCD camera**
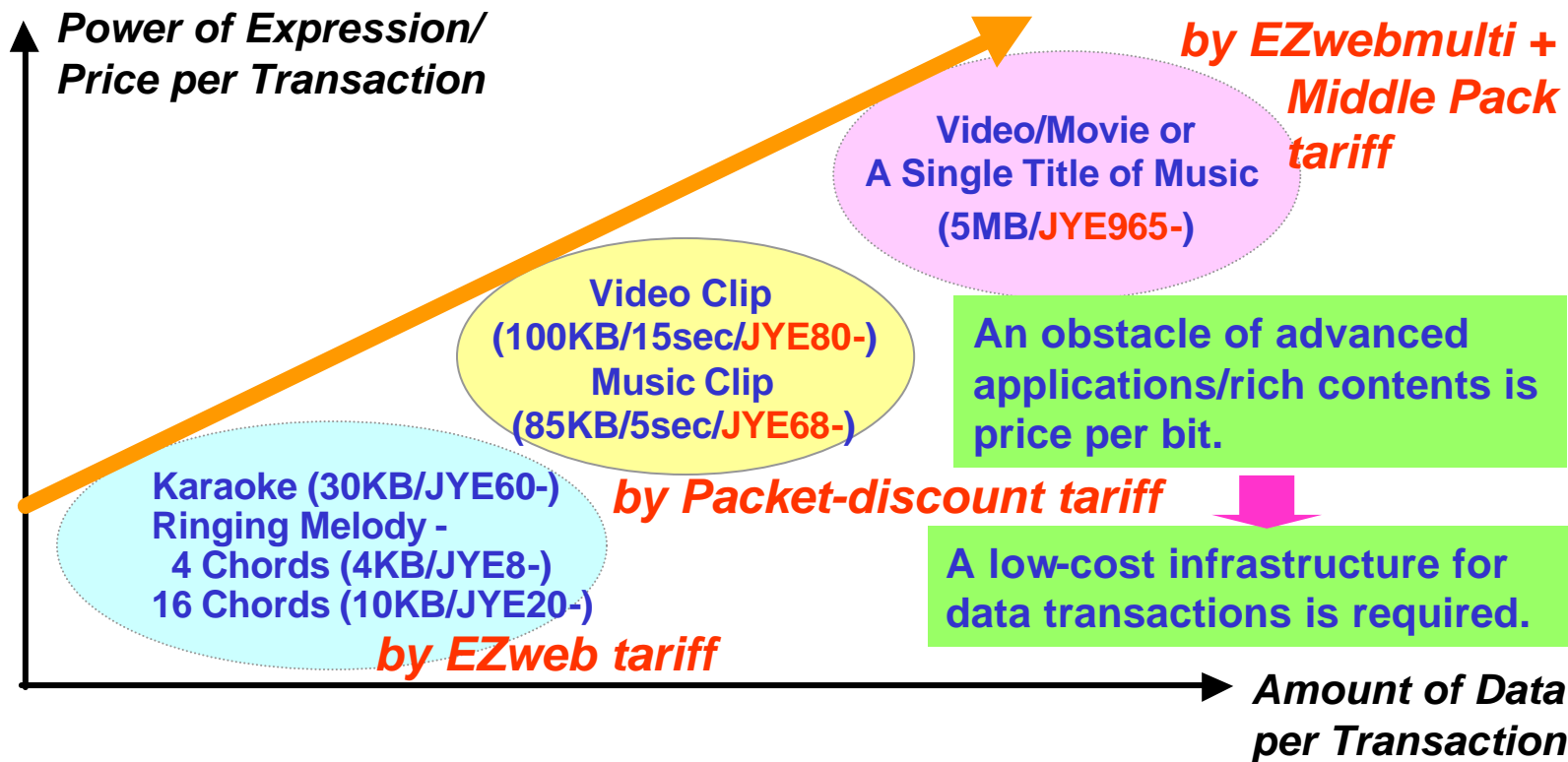- **260,000-color TFT display**
- **40-chord melody ring**

- **310,000-pixel CCD camera**
- **260,000-color Crystal-Fine LCD display**
- **40-chord melody ring**

Objectives and Goal for 3G Migration:
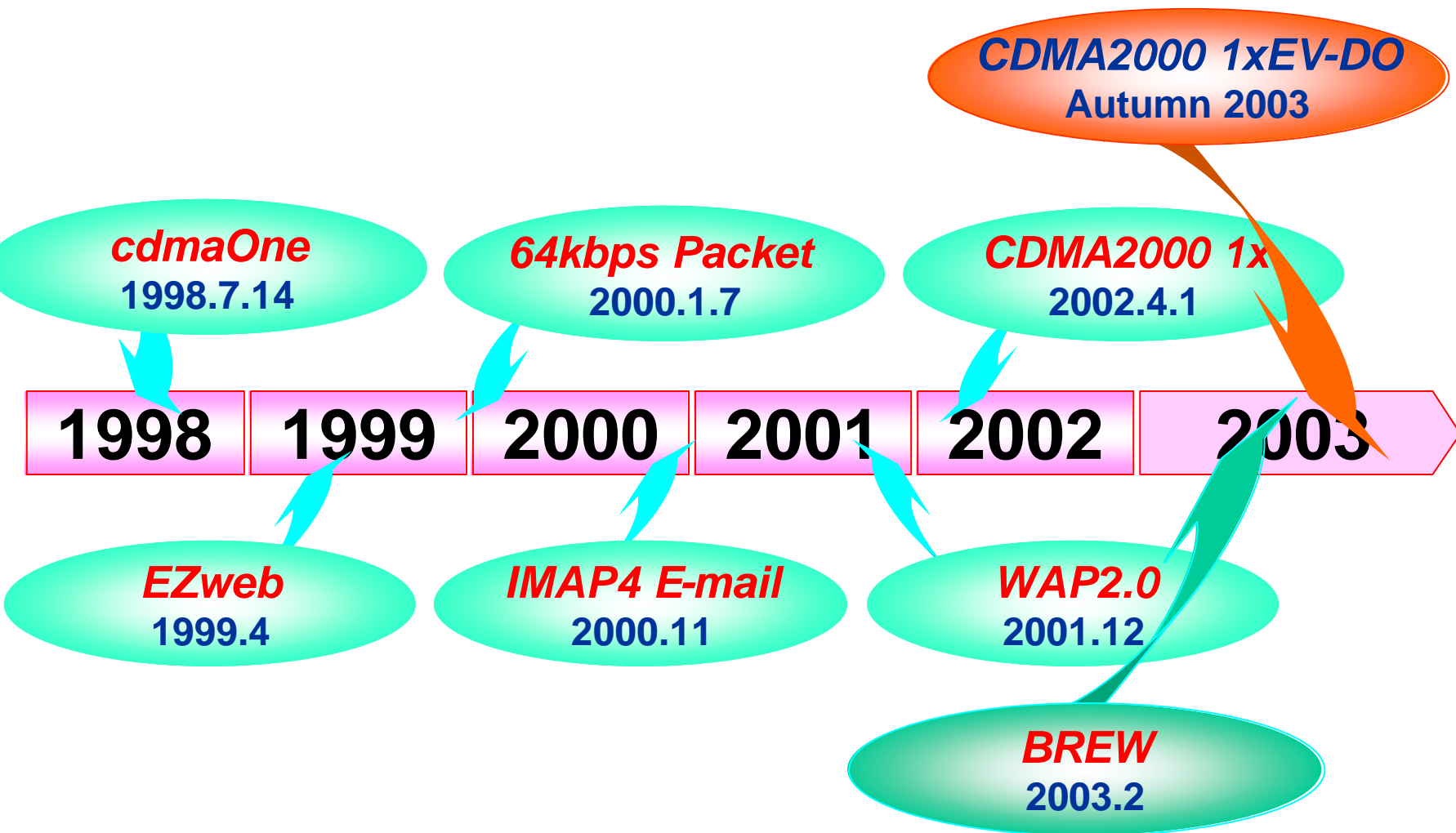
au's Next Step

What Do Customers Want for 3G? -
Obviously Large-Volume Contents with Low Price

☐ **Reducing price/bit is essential to provide rich contents.**

Power of Expression/ Price per Transaction

by EZwebmulti + Middle Pack tariff

Video/Movie or A Single Title of Music (5MB/JYE965-)

Video Clip (100KB/15sec/JYE80-) Music Clip (85KB/5sec/JYE68-)

An obstacle of advanced applications/rich contents is price per bit.

Karaoke (30KB/JYE60-) Ringing Melody - 4 Chords (4KB/JYE8-) 16 Chords (10KB/JYE20-)

by Packet-discount tariff

A low-cost infrastructure for data transactions is required.

by EZweb tariff

Amount of Data per Transaction

au's Approach towards Multi-media Era: Evolutional Approach

CDMA2000 1xEV-DO
Autumn 2003

cdmaOne
1998.7.14

64kbps Packet
2000.1.7

CDMA2000 1x
2002.4.1

1998	1999	2000	2001	2002	2003

EZweb
1999.4

IMAP4 E-mail
2000.11

WAP2.0
2001.12

BREW
2003.2

3G Migration Paths
for Major Mobile System Standards

Core Networks

Radio Access Technologies

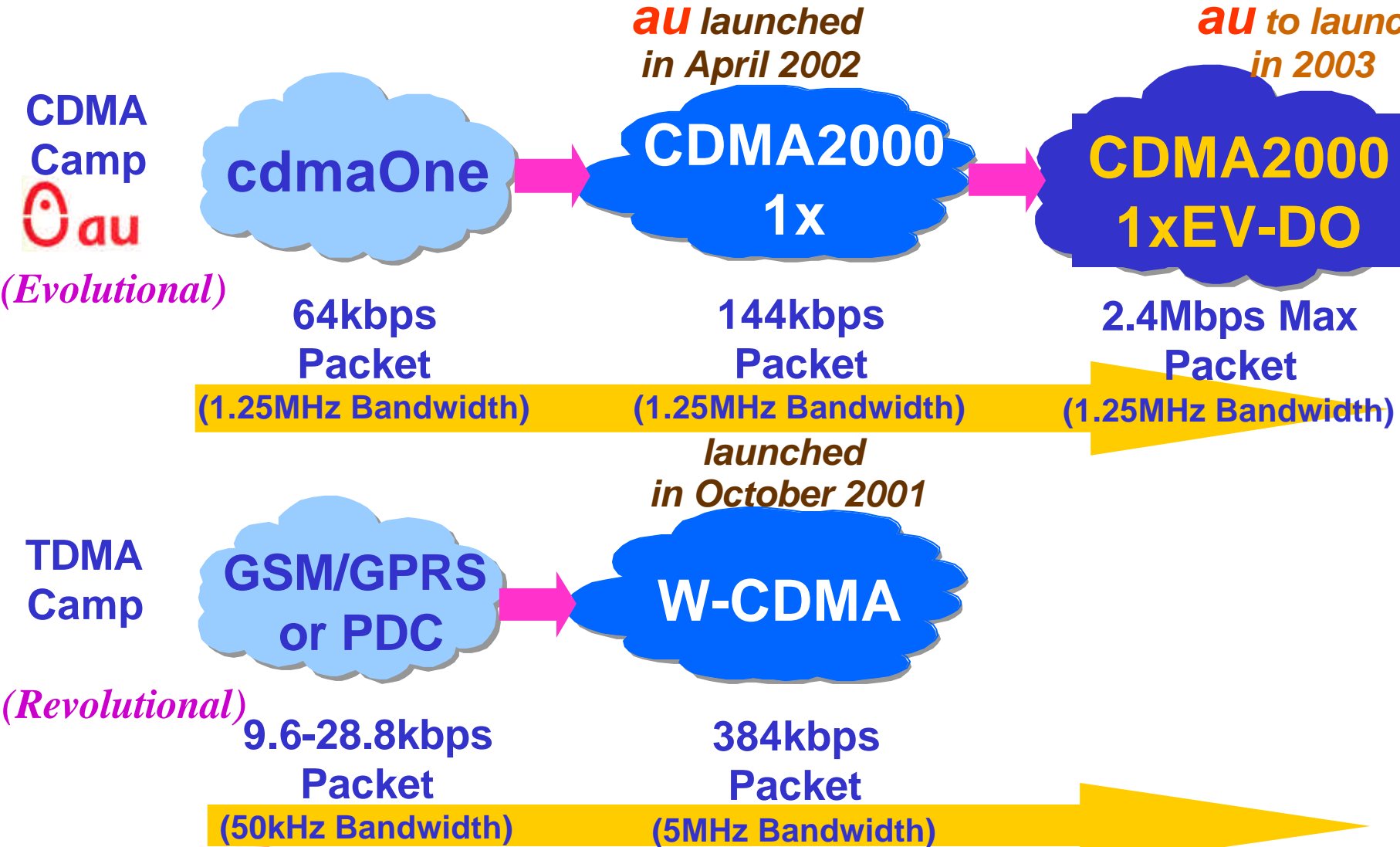| 3rd-Gen | 2nd-Gen | | 2nd-Gen | 3rd-Gen | 3rd-Gen & beyond |

CDMA2000 Family

ANSI-41 — cdmaOne → cdma2000 1x → cdma2000 1xEV-DO

cdma2000 1x → cdma2000 1xEV-DV

?

All IP Core

D-AMPS → UWC-136

GPRS

?

GSM-MAP — GSM → EDGE

PDC-MAP — PDC

W-CDMA (UMTS) → HSDPA

1xEV-DO: 1x Evolution
Data Only
1xEV-DV: 1x Evolution
Integrated
Data & Voice

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au's Scenario for Mobile Data Infrastructure

CDMA Camp

au launched
in April 2002

au to launch
in 2003

cdmaOne → **CDMA2000 1x** → **CDMA2000 1xEV-DO**

(Evolutional)

64kbps Packet
(1.25MHz Bandwidth)

144kbps Packet
(1.25MHz Bandwidth)

2.4Mbps Max Packet
(1.25MHz Bandwidth)

launched
in October 2001

TDMA Camp

GSM/GPRS or PDC → **W-CDMA**

(Revolutional)

9.6-28.8kbps Packet
(50kHz Bandwidth)

384kbps Packet
(5MHz Bandwidth)

CDMA2000 1xEV-DO: Further Upgrade Path towards Multimedia Era

CDMA2000 1xEV-DO (1x Evolution-Data Only)

❑ *A radio interface tailored for <u>asymmetric</u> high data rate <u>packet</u> communication with mobility*

- ✓ A forward link sector throughput at the rate of <u>600kbps or higher average</u> with <u>2.4Mbps peak</u>, which performs very much higher (bps/Hz) than CDMA2000 1x or W-CDMA

- ✓ <u>Best-effort</u> type wireless data communication system, where subscriber terminals with better link conditions will automatically have higher data rates

- ✓ <u>1.25MHz spectrum occupancy</u> per radio carrier that is compatible with CDMA2000 1x

- ✓ A simple <u>IP-based core network</u> design

❑ *A radio interface of the cdmaOne/CDMA2000 family*

- ✓ Spectrum Occupancy, RF Characteristics and Link Budgets equivalent to CDMA2000 1x, allowing collocation of CDMA2000 1xEV-DO carriers and base stations with those of CDMA2000 1x network

Positioning of CDMA2000 Family in Major Mobile System Standards

System		CDMA2000 1xEV-DO	cdmaOne (IS-95B)	CDMA2000 1x	W-CDMA
Spectrum Occupancy		1.25 MHz	1.25 MHz	1.25 MHz	5 MHz
Services		Data Only	Voice + Data	Voice + Data	Voice + Data
Connection Mode		Packet Only	Circuit + Packet	Circuit + Packet	Circuit + Packet
Max Data Rate per User	**F/L**	2.4 Mbps	64 kbps	153.6 kbps	384 kbps (up to 2Mbps)
	R/L	153.6 kbps	14.4 kbps	64 kbps (153.6 kbps)	64 kbps (384 kbps)
Sector Throughput (F/L)		600 kbps or more	approx. 125 kbps	approx. 220 kbps	approx. 1000 kbps
Spectral Efficiency (bps/Hz)		0.48	0.1	0.18	0.2

Higher Spectral Efficiency

Thank You

www.kddi.com