

Opportunities and Challenges Facing CDMA Community in Mobile Broadband Era

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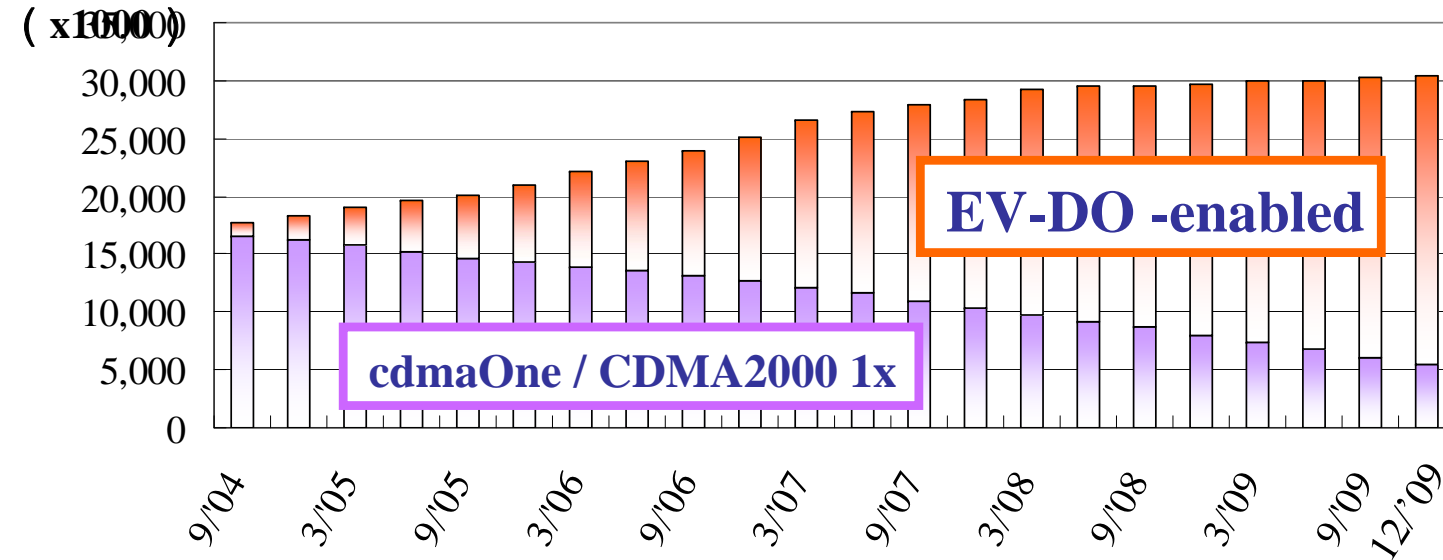
23 March 2010

CDG's 3G CDMA Forum

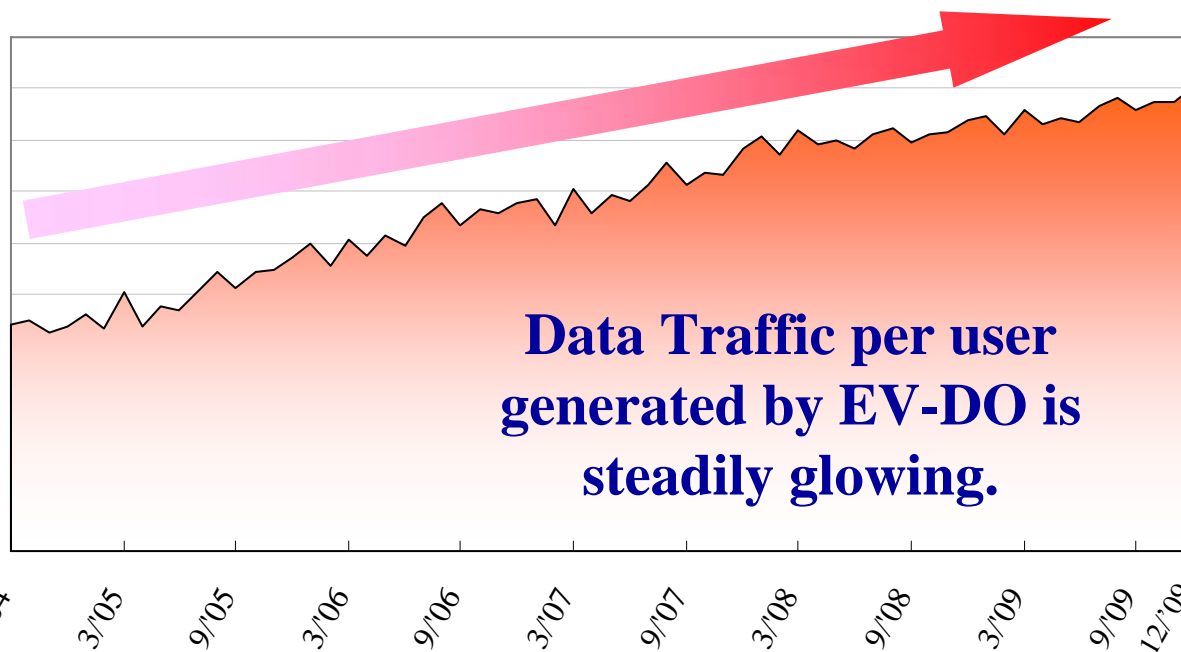
Las Vegas

- 1. The Internet Driving Broadband Use Cases**
2. Opportunities and Challenges
3. Our Approach

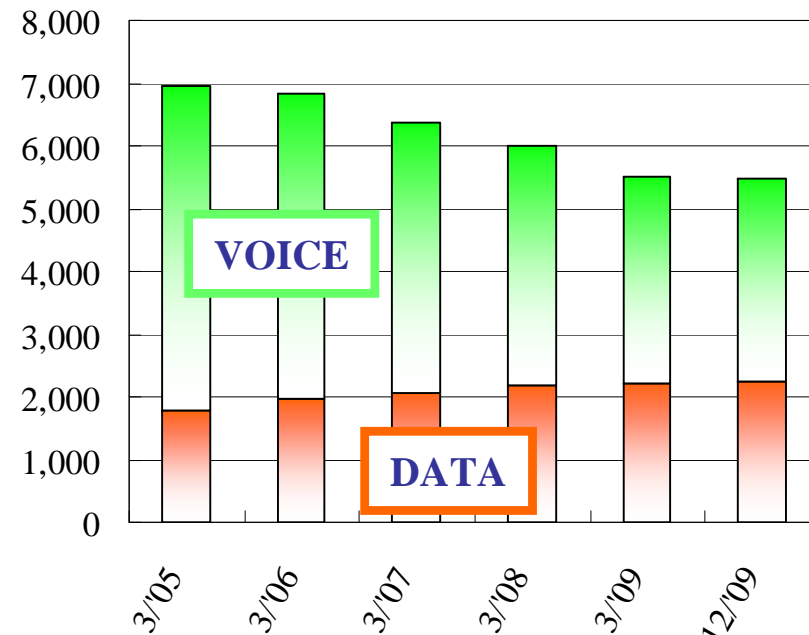
No. of au Subscribers



80% of "au" users are now using EV-DO.



ARPU



Lessons from Japan's Market

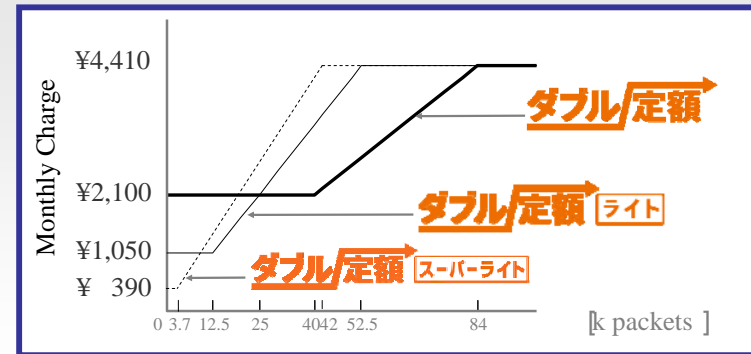
- The key for the data market stimulation was the “offering of All-In-One package” through “FeaturePhone” to the customers.

Handsets



FeaturePhones

Price Plan



“All-You-Can-Eat” Data Plan

Services/Contents



New-lifestyle Proposals

Network



Enhanced bandwidth & Coverage equivalent to voice services

- Who knows what application/contents breaks out?
- Our lesson suggests “Mobile broadband” tends to follow “The Internet.”

Example 1: Music Download (2003)

iPod was the precedence

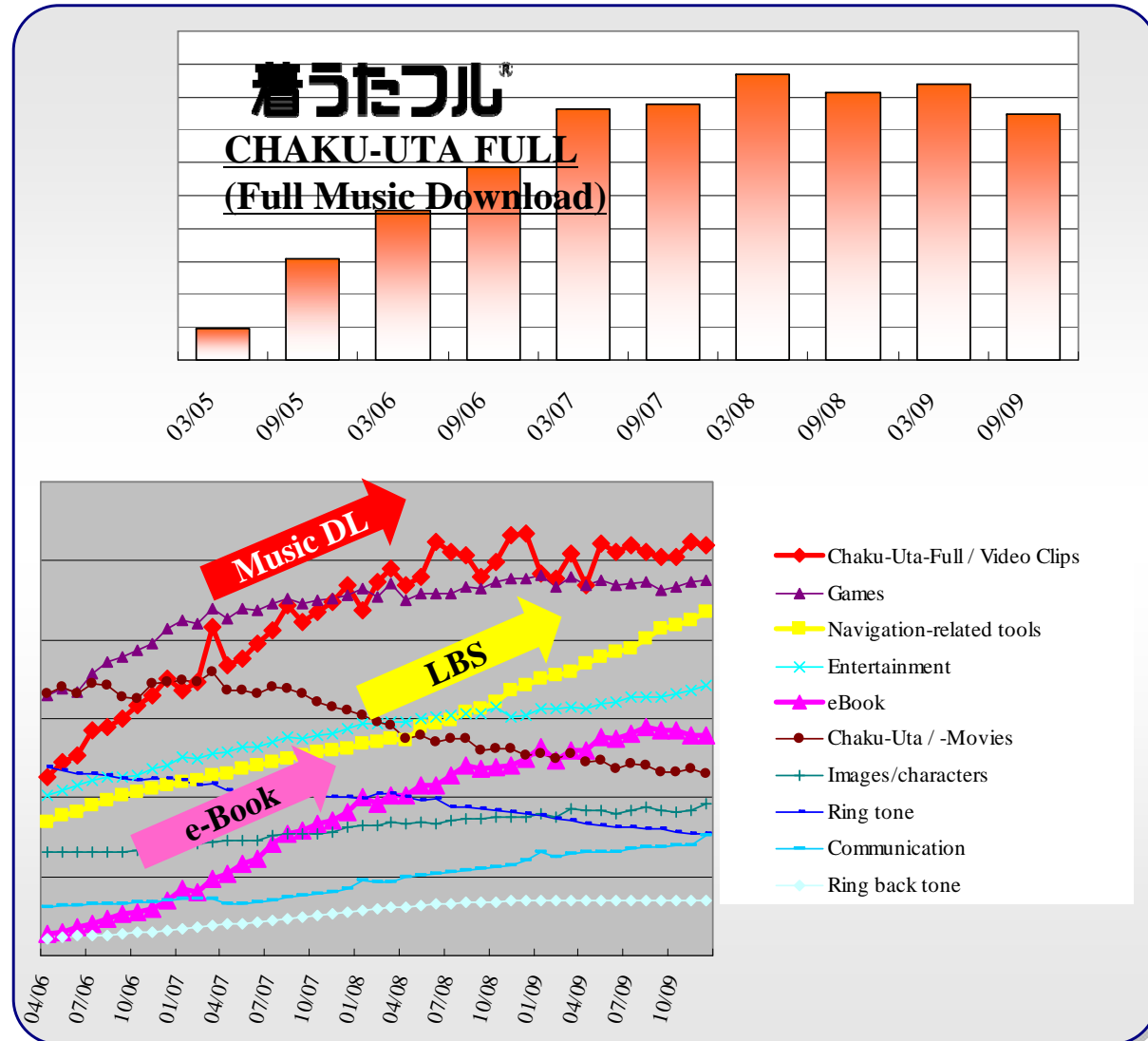
Example 2: eBook (2003)

Steadily grew ahead of market acceptance of Kindle

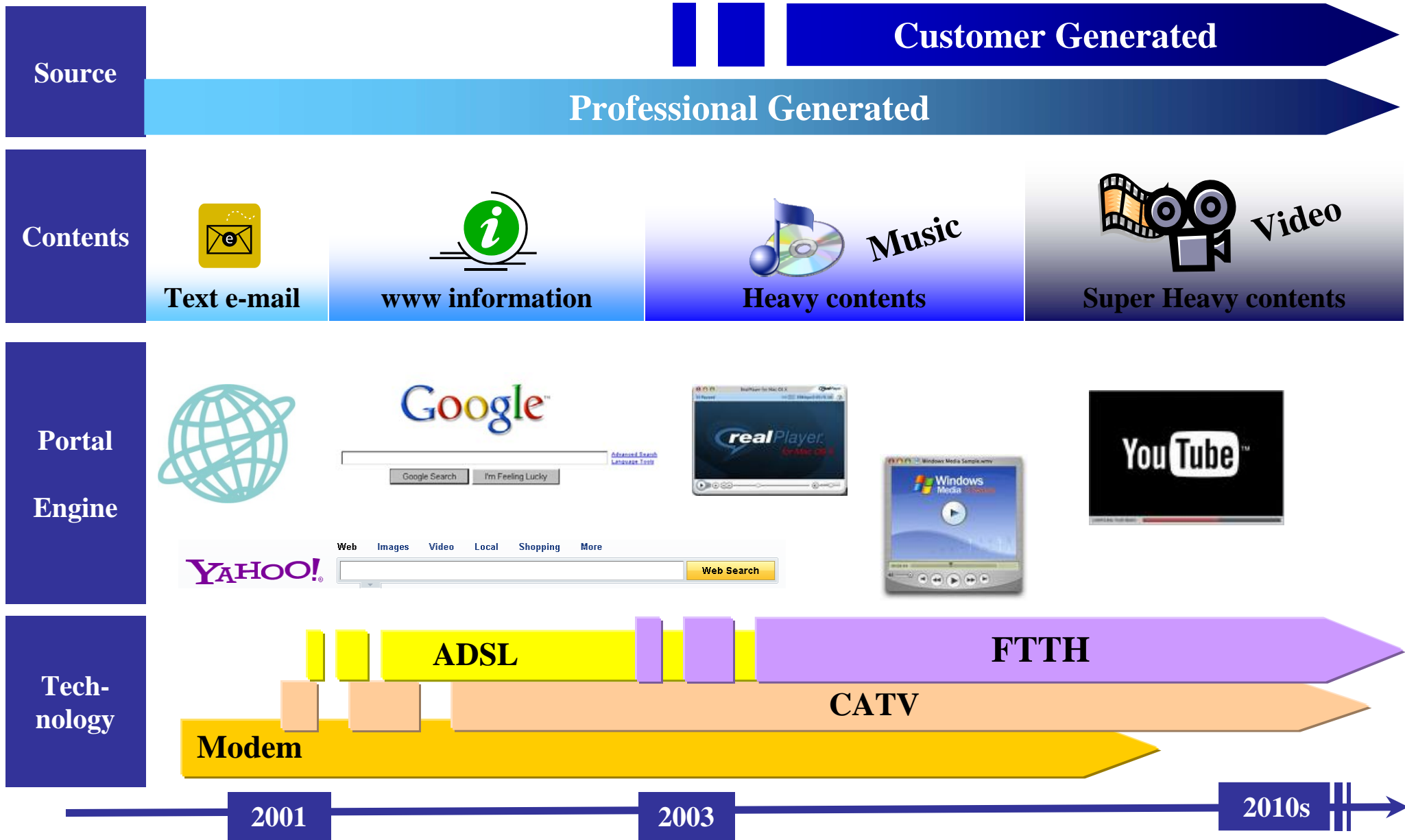
Example 3: LBS (2007)

Mobile-specific Application,
KDDI struggled to make it happen
for years;

“Where am I?” did not work and
“Navigation” worked at last.



Lessons from The Internet and Its Applications



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➤ Information Upload, Anytime, Anywhere

- The advantage of mobile broadband is “Ubiquity”, allowing customers and devices to upload any information related to surroundings.

➤ EV-DO and MC-Rev.A still viable solutions on a global basis.

- EV-DO and Multi-carrier DOrA (MC-Rev. A) are competitive to UMTS/HSPA in terms of their performance and cost structure. They will stay viable solutions for the reasonable period of the future on a global basis.

➤ CDMA has secured upgrade path to LTE

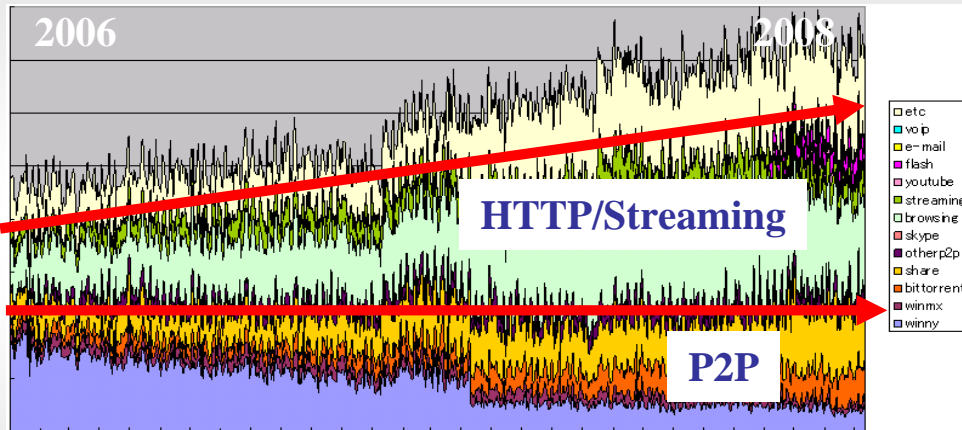
- In the long run, LTE will be the surviving global standard for the broadband cellular system. CDMA has secured the upgrade path to LTE. Nonetheless, it will take time for LTE to be globally deployed, leading to the bigger Ecosystem.

➤ WiMAX is ready and some new spectra made available

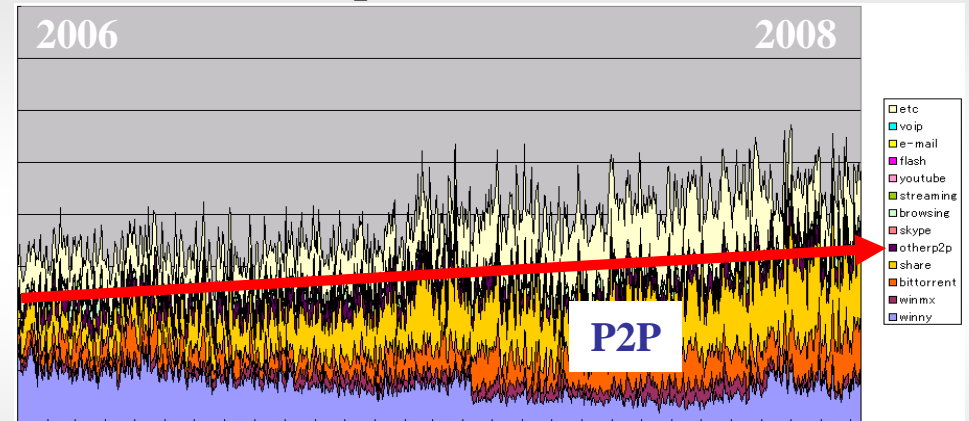
- WiMAX is one of the best wireless systems as the Ethernet extension and has secured some new spectra separately from CDMA and/or UMTS. Refer to UQ Communications, a KDDI company and Clearwire, Sprint Nextel company.

Growth in The Internet Traffic and Its Attribute

Fixed Internet Downlink

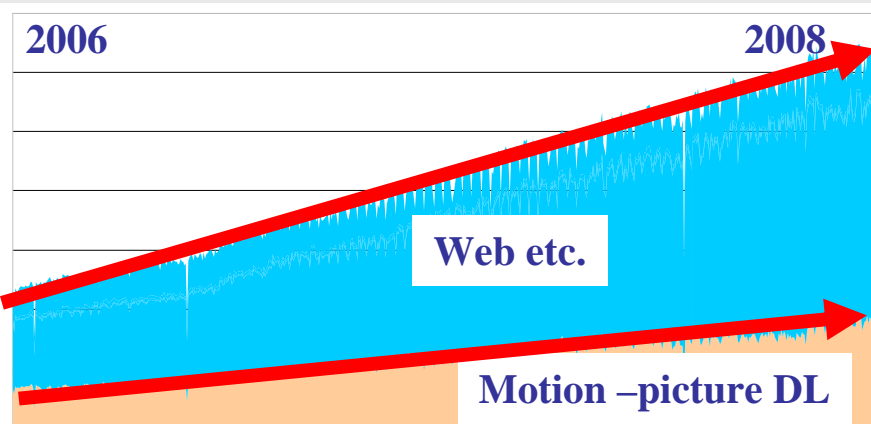


Fixed Internet Uplink

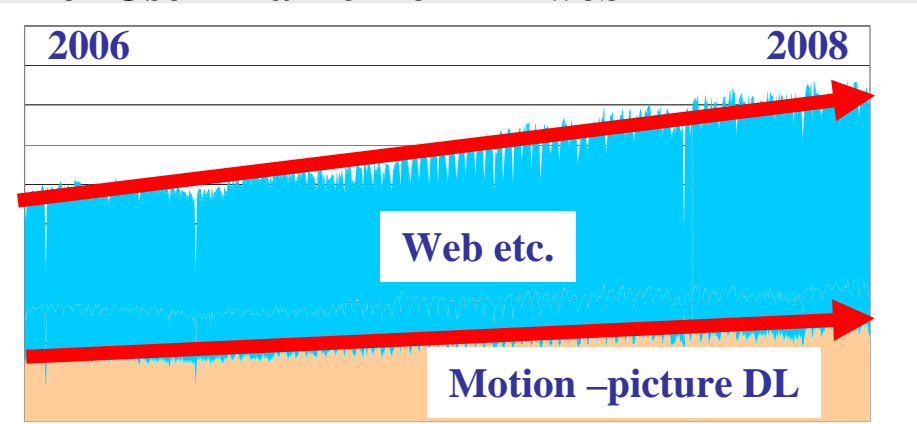


Traffic per user has grown 2x in 2 years for downlink.

Mobile Total Traffic from EZweb



Per User Traffic from EZweb



Traffic per user has grown 2x in 3 years for downlink.

➤ Limit in spectrum availability

- This is the challenging issue regardless of CDMA, UMTS or LTE under the circumstance of bandwidth hungry Internet era. How can we add new spectra for 3G and beyond and how can we re-farm existing spectra used by 2G and 3G?

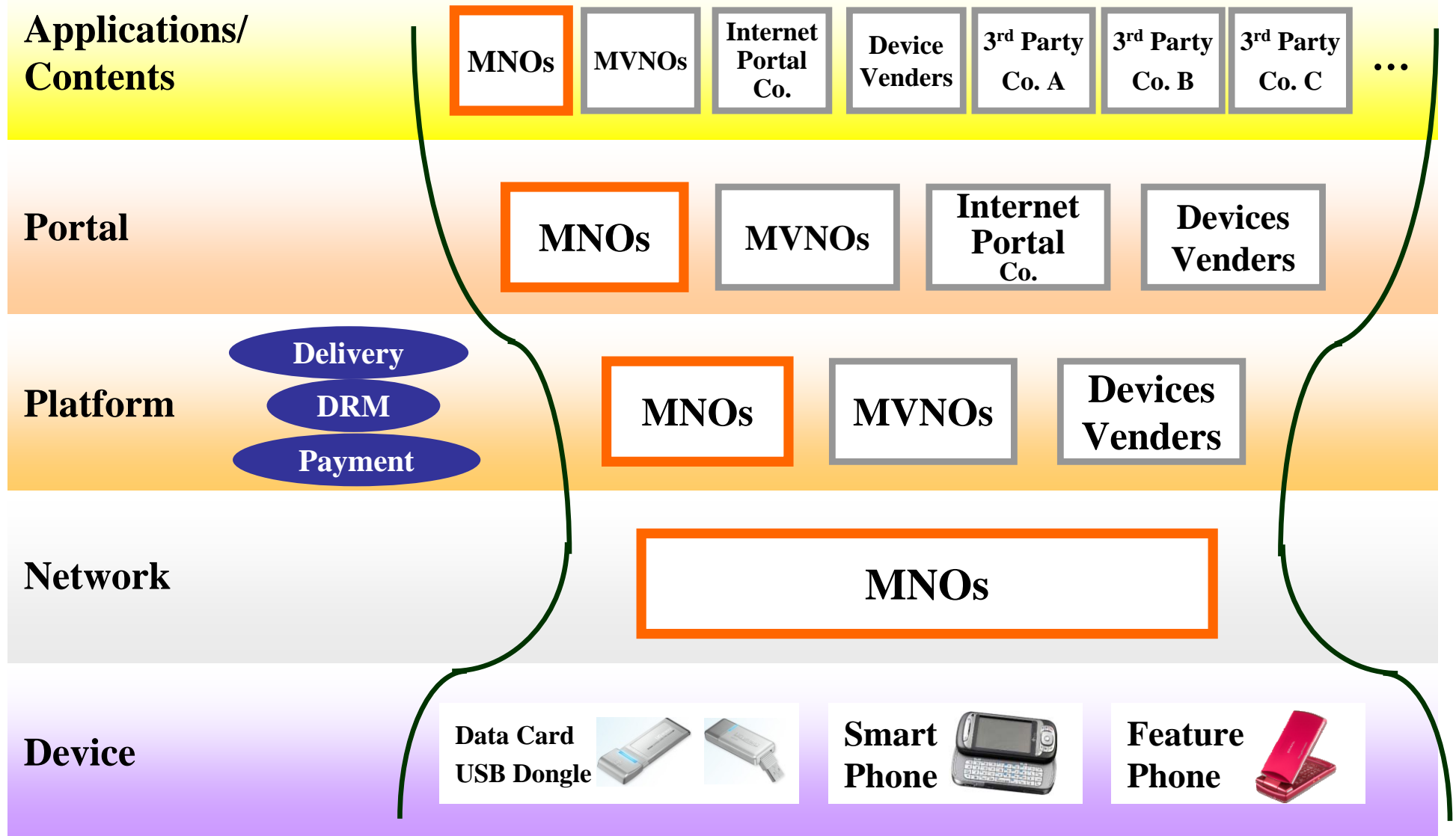
➤ Globally common spectra for LTE deployment unlikely

- In 3GPP, many band classes have been defined: 700MHz, 800MHz, 900MHz, 1.5GHz, 1.7GHz, 1.8GHz, 2.1GH and 2.6GHz. This leads to the advantage of existing 3G networks including CDMA and EV-DO.

➤ Infrastructure cost

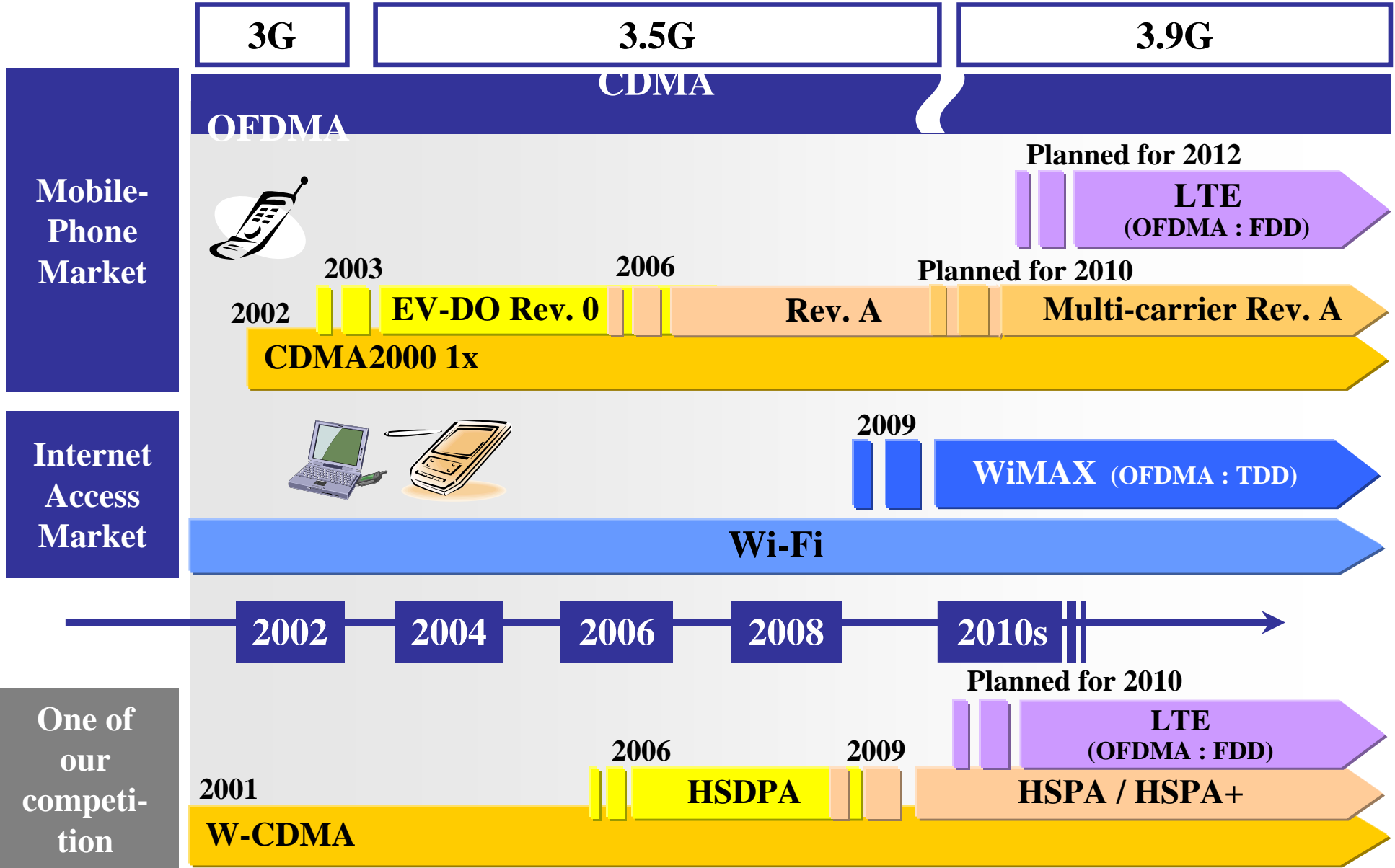
- The customer perception for the broadband access service is the “All-You-Can-Eat” flat rate. How can MNOs manage the ROI in bandwidth without the expectation of increase in ARPU? – Can the single standard and well-defined interface specification between nodes, leading to the real multi-vendor procurement environment, be the answer?

Revenue Opportunities and Competition



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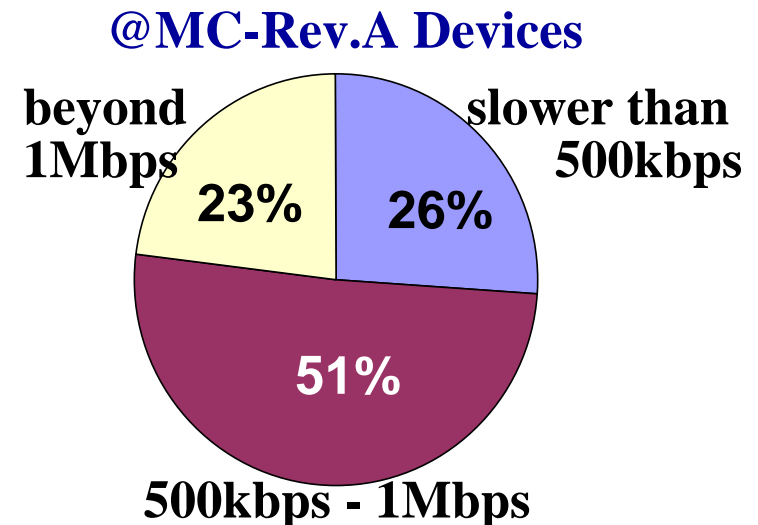
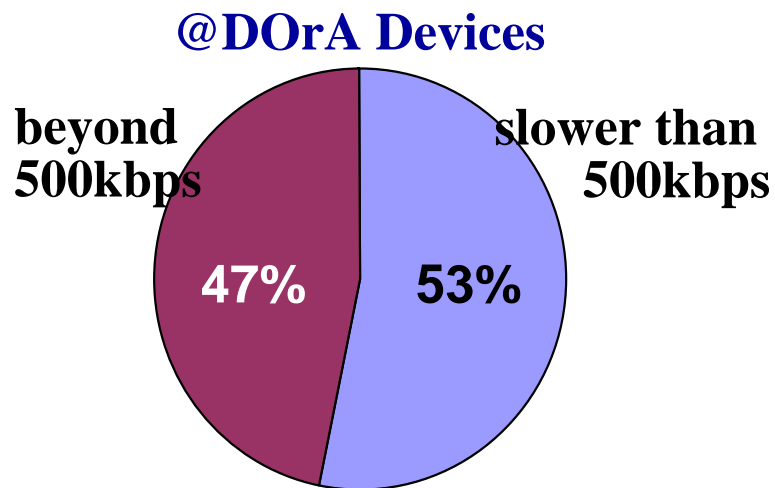
Our Approach towards Mobile Broadband Era



➤ What is MC-Rev.A by KDDI definition?

- Multi Carrier EV-DO Rev. A (MC-Rev.A) is a subset of EV-DO Rev. B.
- MC-Rev.A supports bundling up to three (3) DOrA carriers, compared with Rev.B bundling up to 15 DOrA carriers.
- MC-Rev.A does not support 64QAM that composes EV-DO Rev. B.
- Consequently, MC-Rev.A can be implemented solely by the software upgrade of radio access network equipment.

➤ Expected Throughput Improvement by MC-Rev.A: Simulated user throughput over the nationwide “au” EV-DO network



Designing The Future

