

おはよう！



TM

MODE

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What is



nformation

nternet

entertanment

Advance... Anytime... Anywhere...



Facts & Figures

- Early deployment
 - Packet network launch 1997
 - iMode introduced in Japan in Feb. 1999
 - After 14 months, over 6 million subscribers
- iMode a huge success
 - Always on – No dial up!
 - Fixed charge of 3\$ per month, 30cents per packet
- Bandwidth
 - Maximum speed for download is 9.6kbit/sec
 - 3G: 384kbit/sec(download) & 64kbit/sec (Upload)



- 40 million paying subscribers (as of Nov 18, 2003) and more than 3000 companies across Asia and Europe





Development Goals

- Convenience of a Mobile Phone
 - Enjoy browsing without bulky Computer or PDA
- User Friendliness (Ease of Use)
 - Adapt to Users with low awareness of Internet
 - Adapt browser to mobile device
- Internet Technologies Support
 - IP, TCP, HTTP, SSL, Java
- Media diversification
 - Allow third parties to provide information
 - Billing Services



Information
Internet
entertainment

Major Features :

- Email
- Mobile Banking
- Games
- MMS



eBay



Die Bahn



kicker



i-meteo

Image Source: <http://www2.eplus-imode.de/>



Information
Internet
entertainment



Video Streaming
mit i-mode™

- Video Streaming media
- Mobile / Interactive TV

- Java application :
i-meteo



eBay



Die Bahn



kicker



i-meteo



Der weltweite Online-Marktplatz

- 1 eBay Suche
- 2 Ein/ausloggen
- 3 Top-Angebote
- 4 Kategorien
- 5 Galerie-Artikel

Wählen  i-mode

- Internet/Web Access
- E-commerce / Mobile Payment
- Ticket Booking

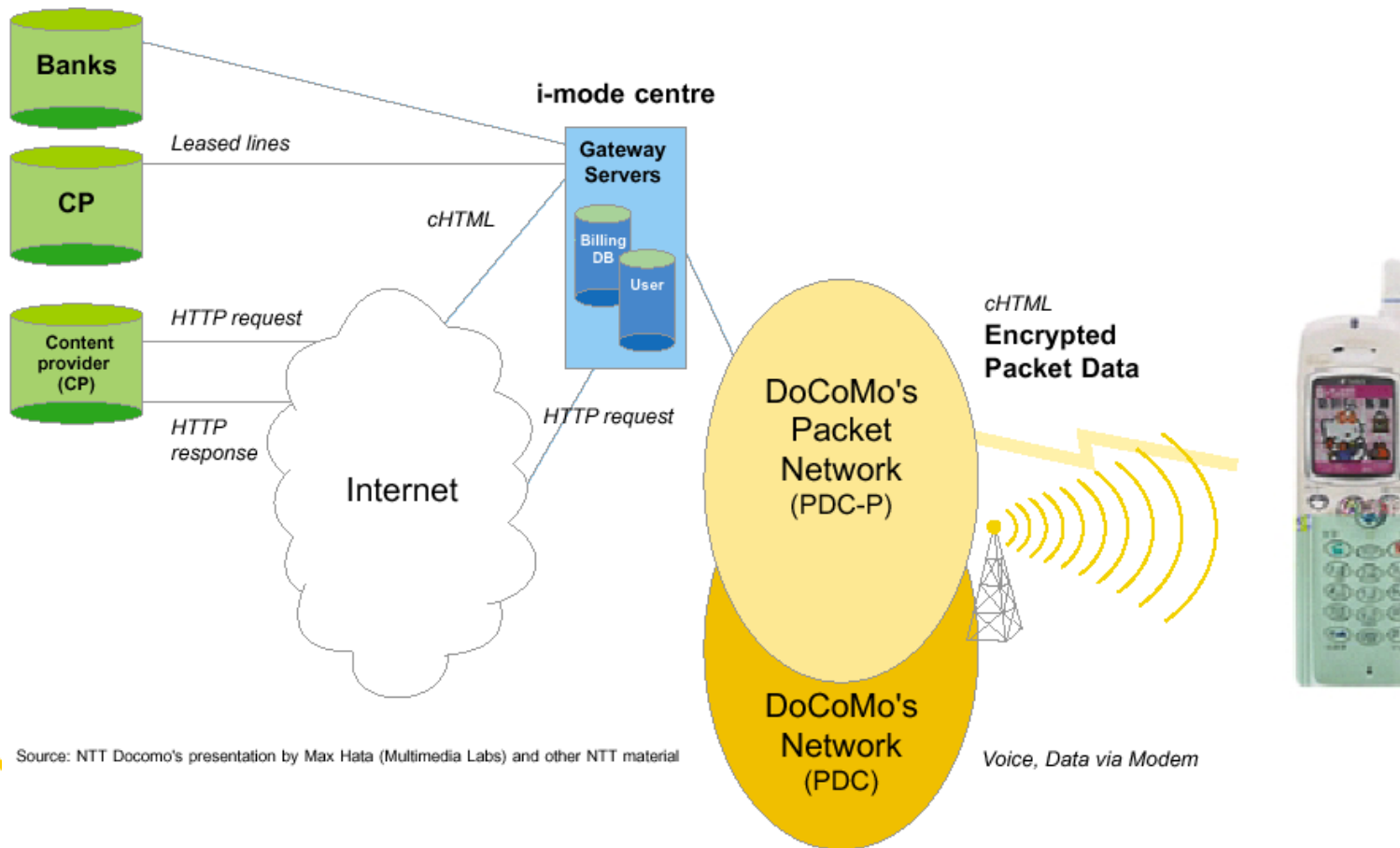


Other Current and Future Services

- Car Navigation System
- Schedule Management
- Bulletin Board System
- Multi-party Conferencing
- Karaoke
- Fortune-telling / Horoscope
- Dictionary search
- Downloadable Files and Music
- Flash software
- Route/Location Service
- CAD
- Complex vector graphics
- Animated Mail
- Vending Machine Interface
- Workflow Management



Architecture

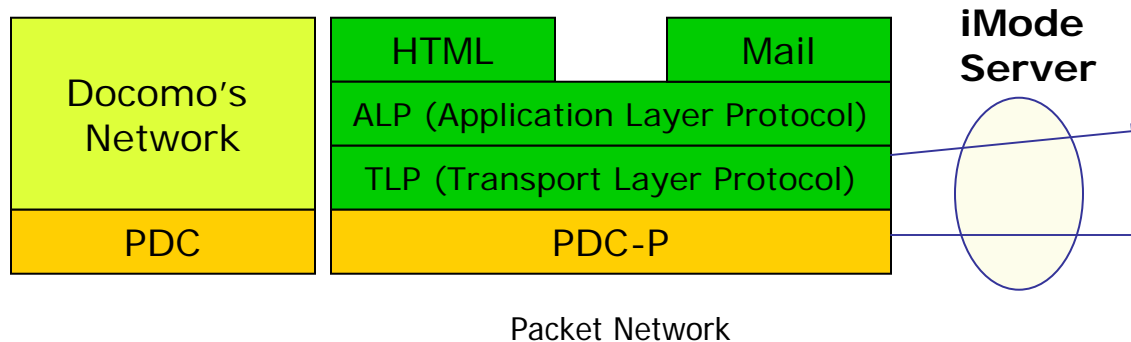


Source: NTT Docomo's presentation by Max Hata (Multimedia Labs) and other NTT material



New Protocols

- **TLP** (Transport Layer Protocol) (TCP in the internet)
 - Improved efficiency in PDC-P network over TCP (uses fewer packets to save charges)
 - Higher data packet ratio
- **ALP** (Application Layer Protocol)
 - Supports both pull (HTTP) and push communication (Email)
 - Direct HTTP communication between mobile phone and iMode server
- **UITP** (User Information Transfer Protocol)
 - sends subscriber information from PDC-P network to iMode server
- **NWMP** (Network Management Protocol)
 - performs signaling
 - Start/end of packet communication
 - E.g. email delivery, push content notification





Security: Serious Issue

(M-commerce Intensive)

- SSL (adopted March 2001)
 - **Server-side authentication** - End-to-end SSL(e-eSSL)
 - Server sends digital certificate to the Client
 - **Client-side authentication** is future work
 - Non-repudiation is not yet possible
 - Between ISP and iMode server (s-sSSL)
 - Between iMode Server and service providers
 - Built in Java Security - Java Application Manager (JAM) prevents access to handset



Hardware Demands

- Power ICs
 - Most energy consumed by power amplifier
 - New applications require more power
 - SSL, Multimedia, Java
- Memory
 - 10x larger memory required
 - Non-volatile storage required for media distribution
- LCD
 - More colors, faster response speed (power required)
- Battery
 - Currently 30% of unit total weight (large)

K. Enoki, "iMode: The Mobile Internet Service of the 21st Century"
H. Yazaki et. al., "Overview of Advanced iMode Mobile Phones"



WAP vs iMode

WAP

- Specification for presenting and interacting with information on wireless
- Sites based on new WML
- 39% of world's wireless internet users
- Usually used over circuit switched connections
- Services business-oriented, work-oriented
- Anyone can produce content, content menus

iMode

- ◆ Wireless internet service (could be deployed over WAP)
- ◆ Sites based on cHTML
- ◆ 60% of world's wireless internet users
- ◆ Usually used over packet switched connections
- ◆ Services user-oriented, fun-oriented
- ◆ Anyone can produce content, DoCoMo operates content menus



Application Scenario: Railroad Facility Management System

- Japanese railroad companies use PDAs
 - Display diagrams of wires, tracks, signals, communications
 - Collect data and workflow management
 - Consider using iMode phone instead
- Disadvantages of PDA:
 - Too heavy, difficult to operate
 - Low bandwidth (wired)
 - No dynamic updates
 - Expensive
- Disadvantages of iMode phone
 - Small display size
 - Spotty coverage (tunnels, near buildings)
 - Low bandwidth (wireless)

Source: M. Kikuchi, Y. Yagi, "Use of iMode Cellular Phones for Facility Management System"



Conclusion

- iMode is just a strategic combination of available technologies.
- iMode proved that existing technology can create value.
- Success: Continuous access to the Internet, anytime, anywhere, at low cost.
- Changes the function of mobile to a mobile secretary.



References

- Web sites:
 - The iMode FAQ: <http://www.eurotechnology.com/imode/faq-sec.html>
 - <http://www.acsac.org/2001/papers/61.pdf>
 - Official iMode Site: <http://www.nttdocomo.com/imode/top.html>
- "Special Issue on iMode Service", NTT DoCoMo Technical Journal, Oct. 1999.
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- "Wired versus Wireless Security: The Internet, WAP and iMode for E-Commerce", ACSAC 2001
- "iMode: The Mobile Internet Service of the 21st Century", ISSCC 2001
- "Learning from iMode," IEE Review, Nov. 2001



Domo Arigato!

