Ten Reasons: Why it makes sense to upgrade to EV-DO

December 2009
Reason #1:
To deliver affordable broadband access
Lower Total Cost of Ownership

*EV-DO offers an economical solution for generating substantial revenue*

**Lower CapEx:**
- Covers same footprint as other 3G broadband technologies with 50% less sites
- Deploying & maintaining CDMA2000® network is up to 23% lower than GSM/EDGE
- Scalable, modular and low-cost IP network elements

**Reduced OpEx:**
- Fewer base stations and backhaul connections
- Reduced O&M staff can support twice the number of IP network elements than traditional networks

**Lower Spectrum Costs:**
- EV-DO operates in the lower and more affordable frequency assignments
- Increased spectral efficiency delivers broadband data packets at a lower cost per bit

**Affordable Devices**
- USB broadband data modems are available for <$35 USD (wholesale)
- More than 775 competitive EV-DO devices from more than 60 suppliers
Reason #2:  
To Offer a Large Selection of Affordable Devices
Large Selection of Affordable Devices

- Entry-level Voice-centric Handsets
- Personal Messaging Phones
- Fixed Wireless Phones
- Smartphones
- Fixed Wireless Terminals
- Consumer Electronic Devices
- USB Modems
- Wi-Fi Routers
- WorldMode™ Global Roaming Phones
- Television Phones
- Personal Computers

More than 2,320 devices from 123 suppliers

Watch TV on a large screen from your mobile phone using TV Out cables
Reason #3: A Low-risk, Proven Business Case
EV-DO: A Proven Business Case

EV-DO offers an economical solution for generating substantial revenue

A large selection of EV-DO device and service offerings are satisfying user demand in all market environments

EV-DO provides superior performance and an enhanced user experience

EV-DO provides seamless connectivity across all topologies

At lowest CAPEX & OPEX

A Strong Value Position
EV-DO: Competitive Advantage

EV-DO offers a competitive solution for developed and emerging markets

- Carrier-grade broadband Internet, VoIP and multimedia access
- Large coverage areas
- Centralized and distributed IP-based core networks
- A broad selection of affordable devices
- A large selection of services
- Low cost per minute, message, and megabyte
- Network flexibility and scalability
- Privacy and security
- Rapid deployment
- Robust and future-proof technology roadmap
- Large economies of scale
- Reliable and mature

A mature and affordable solution for delivering broadband services
Reason #4: To Drive Subscriber Growth
Adoption of industry leading EV-DO broadband exceeded industry expectations.

**Global EV-DO Subscriber Forecast**

136 million people use EV-DO broadband data services offered by 168 service providers worldwide.

---

<table>
<thead>
<tr>
<th>Year</th>
<th>EV-DO Subscribers Worldwide (Cumulative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002*</td>
<td>0.2 million</td>
</tr>
<tr>
<td>2003*</td>
<td>4.4 million</td>
</tr>
<tr>
<td>2004*</td>
<td>12.1 million</td>
</tr>
<tr>
<td>2005*</td>
<td>24.4 million</td>
</tr>
<tr>
<td>2006*</td>
<td>55.1 million</td>
</tr>
<tr>
<td>2007*</td>
<td>90.5 million</td>
</tr>
<tr>
<td>2008*</td>
<td>112.4 million</td>
</tr>
<tr>
<td>2009**</td>
<td>142.9 million</td>
</tr>
<tr>
<td>2010**</td>
<td>175.3 million</td>
</tr>
<tr>
<td>2011**</td>
<td>209.6 million</td>
</tr>
<tr>
<td>2012**</td>
<td>246.0 million</td>
</tr>
<tr>
<td>2013**</td>
<td>276.4 million</td>
</tr>
</tbody>
</table>

*Source: Actual CDMA Development Group

**Source: Net growth average of Strategy Analytics (Jun 2008), ABI (Aug 2008), Wireless Intelligence (Jul 2008), WCIS+ (Jul 2008), iGR (Mar 2008) and Yankee Group (Jun 2008) for subscriber forecasts (2008 and beyond) summed with CDG actual numbers of 2008
EV-DO Subscriber Growth

- LGT (S. Korea) 980% in 2 yrs
- Movicel (Angola) 1160% in 3 yrs
- Cell South (USA) 380% in 3 yrs
- Sprint (USA) 112% in 4 yrs
- IUSACELL (Mexico) 150% in 3 yrs
- ACS Wireless (USA) 335% in 3 yrs
- Telecom New Zealand 500% in 4 yrs
- Verizon (USA) 154% in 5 yrs
- Terracom (Rwanda) 150% in 3 yrs
- Movilnet (Venezuela) 105% in 3 yrs
- SkyLink (Russia) 350% in 4 yrs
- KDDI (Japan) 180% in 6 yrs

Source: CDG, operator websites and press releases
Note: Compound Annual Growth Rates (CAGR) shown
Reason #5:
To Drive Revenue Growth
Revenue Generating Services
Early Data Growth Metrics

EV-DO Users (Millions)
- Q306: 13.7M
- Q309: 55.5M
- Growth: 60%

Data ARPU (USD)
- Q306: $7.07
- Q309: $15.59
- Growth: 30%

Data % of Total Revenue
- Q306: 14.1%
- Q309: 30.5%
- Growth: 29%

EV-DO Users (Millions)
- Q306: 3.6M
- Q309: 16.1M
- Growth: 65%

Data ARPU (USD)
- Q306: $7.75
- Q309: $16.25
- Growth: 28%

Data % of Total Revenue
- Q306: 12.7%
- Q309: 29.0%
- Growth: 32%

EV-DO Users (Millions)
- Q306: 10.8M
- Q309: 24.4M
- Growth: 31%

Data ARPU (USD)
- Q306: $22.67
- Q309: $25.75
- Growth: 4.3%

Data % of Total Revenue
- Q306: 29.9%
- Q309: 40.5%
- Growth: 15%

Source: CDG, operator websites and press releases
Note: Compound Annual Growth Rates (CAGR) shown
Reason #6: To Offer Broadband Access Anywhere in the World
EV-DO: Strong Global Presence

165 EV-DO operators globally, 78 of which are Rev. A. Another 73 EV-DO networks are being deployed.

137 million EV-DO Subscribers
165 EV-DO operators globally, 78 of which are Rev A. Another 73 EV-DO networks are being deployed.

**EV-DO Network Growth**

- **EV-DO Rel. 0**
  - Commercial Rel. 0 Networks: 115
  - Rel. 0 Networks in Deployment: 35
  - Rel. 0 Devices from 50 vendors: 548

- **EV-DO Rev. A**
  - Commercial Rev. A Networks: 78
  - Rev. A Networks in Deployment: 38
  - Rev. A Devices from 30 vendors: 226

**Serving 136 million people worldwide**

Source: CDG, December 2009
CDMA2000 WorldMode™ Devices

Global roaming enabled by multi-mode/multi-band devices

CDMA2000 1X & EV-DO

GSM/GPRS

WCDMA/HSDPA

CDMA2000 1X/EV-DO/GSM/GPRS/WCDMA/HSDPA

WorldMode Devices

- AnyDATA ADU-630WH (1X/EV-DO/GSM/WCDMA/HSDPA)
- HTC Imagio (1X/EV-DO/GSM/GPRS/EDGE/WCDMA/HSDPA)
- LG KH-1000 (1X/EV-DO/WCDMA/HSDPA)
- LG SH-100 (1X/EV-DO/HSDPA)
- RIM BlackBerry 9500 Storm (1X/Rev. A/GSM/GPRS/HSDPA)
- RIM Tour 9630 (1X/EV-DO/GSM/GPRS/EDGE/WCDMA/HSDPA)
- Samsung SCH-W200 (1X/EV-DO/GSM/GPRS/EDGE/WCDMA/HSDPA)
- Samsung SCH-W210 (1X/EV-DO/GSM/GPRS/EDGE/WCDMA/HSDPA)
- Samsung SPH-W2100 (1X/EV-DO/WCDMA)
- Samsung SCH-W210 (1X/EV-DO/WCDMA)
- Novatel Wireless USB 1000 (Rev. A/EDGE/HSDPA/HSUPA)

- Sony VAIO VGN-TXN10
- RIM BlackBerry 9500 Storm (1X/Rev. A/GSM/GPRS/EDGE/WCDMA/HSDPA)
- Lenova ThinkPad Series (EV-DO/HSPA)
- Dell Latitude & Precision Series (EV-DO/HSPA)
- Acer Aspire One (EV-DO/HSPA)
- HP Elitebook Series (EV-DO/HSPA)
- HP 6XXX Series (EV-DO/HSPA)
- Panasonic Toughbook Series (EV-DO/HSPA)
Reason #7:
To Leverage Enormous Economies of Scales
Adoption of industry leading EV-DO broadband exceeded industry expectations.

Global EV-DO Subscriber Forecast

EV-DO Subscribers Worldwide (Cumulative)

136 million people use EV-DO broadband data services offered by 168 service providers worldwide.

*Source: Actual CDMA Development Group
With an increasing number of subscribers, the migration process is lengthening. The generational migration process will take many years. Voice will remain the Killer Application. 

Migration Timeline

Migration of Subscribers

2G subs exceed 1G subs – Roughly 15 years after inception of industry.

Reason #8: To Improve the Economy
Why Wireless Connectivity Matters

The social and economic impact is far reaching

- +1% Mobile Penetration
  - Developing Countries
- +4.7% Average per capita income
  - Developing Countries
- +10.5% Average per capita income
- +1% Internet Penetration
  - Developing Countries

Source: Telecommunications Management Group, Inc (TMG) and ITU World Telecommunications Database Statistics, 2007
Reason #9: To Leverage a Long-term Evolution Path
CDMA2000 Roadmap

CDMA2000 offers a strong long-term path forward

**CDMA2000**
- 1X

**1X Enhancements**
- EVRC-B, QLIC, QOF

**1X Advanced**
- New Channel Card
- 4X increase in voice capacity
- DL & UL: 307 kbps

**1xEV-DO**
- Rel. 0
- 1.5X increase in voice capacity
- DL & UL: 153 kbps

**1xEV-DO**
- Rev. A
- DL: 2.4 Mbps
- UL: 153 kbps
(1.25 MHz, FDD)

**1xEV-DO**
- Multi-Carrier
- EV-DO
- H/W Upgrade
- Rev B

**DO Advanced**
- DL: 32 Mbps
(4x1.25 MHz, FDD)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UL</td>
<td>153 kbps</td>
<td>153 kbps</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Capacity increase is primarily due to new EVRC-B codec, handset interference cancellation (QLIC) and Quasi-Orthogonal Functions (QOF).
2. Capacity increase is primarily due to UL and DL interference cancellation, mobile receive diversity and several radio link enhancements.
3. Peak rate for 3 EV-DO carriers with software upgrade. Doubles network capacity or triples peak data speeds.
4. Peak rate for 3 EV-DO carriers with hardware upgrade supporting 64 QAM in the DL. Standard supports up to 15 aggregated 1.25 MHz carriers.
5. DO Advanced includes smart network techniques, new device enhancements, 2x2 MIMO support, 64 QAM in the DL and 16 QAM in the UL.
6. Operators have the option to only implement software upgrades.
**EV-DO Evolution Path**

**EV-DO offers a practical solution to satisfy the real demand for broadband data**

**Rev. A:** High sector capacity, very good link budget and user-experience
- DL: 3.1 Mbps
- UL: 1.8 Mbps

**Multicarrier EV-DO:** A software upgrade that aggregates up to three Rev. A channels
- Triples peak data rates / Doubles network capacity

**Rev. B:** New channel card - more capacity
- DL: 14.7 Mbps
- UL: 5.4 Mbps

**DO Advanced:** More network capacity and speed
- DL: 32 Mbps
- UL: 12.4 Mbps

Operators can improve network capacity and user experience with Incremental software upgrades and network optimizations
CDMA2000 is complemented with several OFDM-based solutions

CDMA2000 Evolution Path

- CDMA2000 1X
- 1xEV-DO Rev. A
- 1xEV-DO Rev. A
- H/W Multicarrier Upgrade
- EV-DO Rev. B
- DO Advanced

OFDMA-based Technologies

- Mobile WiMAX
- LTE

Timeline:

Reason #10: To Maximize and Preserve Return on Existing Investments
CDMA2000 is strongly positioned to serve operator requirements for the long run.