Vodafone Group Technology

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Overview

Focus on service capability expansion while maintaining tight cost control

Broadband Innovation of RAN
- Radio Access Network (RAN) evolution

Roadmap to ‘all IP’
- Core network evolution

Network Economics (capex & opex)
Radio Access Network evolution

<table>
<thead>
<tr>
<th>Today</th>
<th>2006</th>
<th>2009/10+</th>
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</thead>
<tbody>
<tr>
<td><strong>3G deployment</strong></td>
<td><strong>3G evolution</strong></td>
<td><strong>3G evolution</strong></td>
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</table>
| • Currently largest WCDMA network worldwide with 50k 3G base stations | • Expand WCDMA indoor coverage:  
  – 60% in Europe by end-FY06  
  – 90% in Japan in FY07 | • Several options under evaluation currently, including OFDM |
| • Quality broadband indoor coverage:  
  – >50% on average in Europe  
  – >80% in Japan | • Launch HSDPA  
  – 2006 | |
| • Upgrade to HSUPA  
  – 2007/2008 | |

Source: Company data
3G deployment

Focus on indoor coverage

- In Europe, we expect to have 60% indoor coverage by March 2006 and are planning to increase this to about two-thirds by March 2007.
- Beyond this, there are several options dependent on demand:
  - Continued rollout at 2.1GHz
  - Refarm 900 MHz spectrum (if applicable)
  - Rely on GPRS

Cost efficient technology

- Capex and opex benefits increase with traffic loading

Comparison of 2G and 3G

<table>
<thead>
<tr>
<th></th>
<th>Total unit cost</th>
<th>Capacity improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next 1-2 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20%</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>voice</td>
<td>x2.7</td>
<td>x5.5</td>
</tr>
<tr>
<td>data</td>
<td></td>
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</tbody>
</table>

Note:

1 Total unit cost is a combination of opex and depreciation of RAN and relevant transmission capex
2 Achievable today

Source: Company data
3G Evolution – HSDPA

- HSDPA will offer enhanced broadband user experience:

  - **Speed**
    - Throughput:
      - 120 kb/s
      - 222 kb/s
      - 320 kb/s
      - 425 kb/s
      - 800 kb/s
      - 1.2Mb/s

  - Customer experience (%):
    - 90%
    - 50%
    - 10%

- **Time-to-market**

- **Incremental investment**

  - Natural evolution of WCDMA network equipment

  - Full commercial launch in Summer 2006

Source: Company data
EVDO / HSDPA / WiMAX – Comparable Spectral Efficiency

To highlight a few:

- **WiFi**
  - Not suitable for wide area mobile

- **CDMA 2000 1x EV-DO**
  - HSDPA offers comparable spectral efficiency
  - Commercial service today

- **Fixed WiMAX**
  - Not suitable for wide area mobile (a point to multi-point fixed solution)
  - HSDPA offers comparable spectral efficiency
  - Available 2006/2007

- **Mobile WiMAX**
  - HSDPA offers comparable spectral efficiency
  - Technology not yet standardised
  - Available 2008/2009

Vodafone continues to screen new radio access technologies to determine future options.

Comparable technical performance:

- WCDMA/ HSDPA
- WiMAX 802.16
  - Reuse 1/1
- WiMAX 802.16
  - Reuse 3/9
- 1x EV-DO

1 Spectral efficiency is the amount of information that can be transmitted over a given spectrum in a given period of time.

Source: Company data
Core network evolution – move towards “all IP”

<table>
<thead>
<tr>
<th>2004</th>
<th>2006</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>R99</td>
<td>R4</td>
<td>R5</td>
</tr>
<tr>
<td>Separate CS and PS domains</td>
<td>CS Core over IP Split MSC</td>
<td>IP Multimedia Subsystem</td>
</tr>
<tr>
<td>CS voice, data to 384kbps</td>
<td>Push-to-Talk See-What-I-See Presence IM</td>
<td>VoIP Rich Call Gaming</td>
</tr>
</tbody>
</table>

- **Benefits of moving to a standard architecture built around IP**
  - **Standardised equipment** – lowers cost for carrying traffic (packet vs. circuit)
  - **New set of vendors** – alters competitive dynamics reducing costs
  - **New set of service functionality** including lower maintenance

Source: Company data
Network Efficiency: Capex

**Network Capex**

- **FY05**: 100%
  - Radio
  - Transmission
  - Core

- **FY08**: 100%
  - Radio
  - Transmission
  - Core

**Shift in Capex Mix**

- **FY06 and FY07** are peak network capex years:
  - Significant WCDMA indoor coverage achieved by end FY07
  - HSDPA/HSUPA uses existing 3G infrastructure
  - Investment in network simplification and self-build access done by end FY07

**Network capex profile**

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1 Network capex is defined as radio access, transmission and core capex for Vodafone mobile subsidiaries and Vodafone Italy
Network Efficiency: Opex Control

**Goal**
- To achieve flat network opex whilst expanding 3G network

By two approaches:

**Cost control**
- Ensure overall tight cost control in business

**Cost reduction**
- Core network consolidation
- Access network simplification and self-build
- Opex deploying additional access capacity at lower marginal cost
- Consolidation of maintenance and software contracts

Network opex\(^1\) remains essentially flat while the number of base stations is increasing

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\(^1\) Vodafone mobile subsidiaries and Vodafone Italy
Source: Company data
IT consolidation is being implemented using a modular and staged approach

**Objectives**
- Lower opex
- Lower capex
- Continuous growth
- Efficient global management

**Approach**
- Consolidate operations
- Standardise processes and platforms
  - DCC Europe
  - DCC Japan
  - Customer management systems
  - ERP
Service Platforms are being consolidated

- Develop only once for several countries
- Reduce opex and capex
- Enable fast time to market
- Provide consistent user experience

- Status
  - Implementation started 10/04
  - Completion 03/07
Key Messages

• Technology innovation continues to drive growth and differentiation

• Commitment and focus on WCDMA and move towards IP delivers:
  – platform for ongoing service innovation and differentiation
  – time to market advantages
  – cost efficiencies in medium term (both capex and opex)

• Our scale position allows us to focus on expansion of service capability while maintaining tight cost control
Glossary of terms

1x EV-DO  Evolution Data-Optimised (part of CDMA 2000 technology roadmap)
CS          Circuit Switched
DCC         Data Centre Consolidation
ERP         Enterprise Resource Planning
HSDPA       High Speed Downlink Packet Access
HSUPA       High Speed Uplink Packet Access
IM          Instant Messaging
IMS         IP Multimedia Subsystem
IP          Internet Protocol
LTE         Long Term Evolution
MSC         Mobile Switching Centre
OFDM        Orthogonal Frequency Division Multiplexing
PS          Packet Switched
PTT         Push-to-talk
R99, R4, R5, R6, R8  Different phases (known as releases) of 3GPP standards
RAN         Radio Access Network
RT          Real Time
VoIP        Voice over Internet Protocol
WCDMA       Wideband Code-Division Multiple Access
Forward-Looking Statements

This presentation contains "forward-looking statements" within the meaning of the US Private Securities Litigation Reform Act of 1995 with respect to the financial condition of the Vodafone Group (the "Group").

Results of operations and businesses and certain of the Group's plans and objectives. In particular, such forward-looking statements include statements with respect to Vodafone's reiteration of the guidance for its expectations for the year ending 31 March 2006 as to future performance, including turnover, cash flow, capital expenditures and margins, non-voice services and their revenue contribution; share prices; free cash flow, global integration, user penetration and user numbers, and cost savings; cash flow improvements on revenue and capital expenditure; cost margins; expected revenue share; projections related to operating and capital expenditure, cash flow, average revenue per user ("ARPU"), cost savings, and handset costs in 2006; the comparison of data and voice services on mobile networks and the use of fixed line services estimated in 2010; estimates for 2005 of mobile share of total outgoing minutes; Vodafone Passport's impact on penetration and usage levels; the impact of One Vodafone on operating and capital expenditures in 2008 and beyond; and the ability to achieve the cost savings and benefits of the Group's restructuring programs.

These forward-looking statements also include statements related to certain businesses within the Group about the expected performance of such businesses, including statements by Vodafone Italy related to the growth of its market share and its revenues, to its competitive position in the market, to its ability to expand 3G services, including Vodafone live! Music and TV services, to maintain low maintenance costs and to its profitability in the migration towards 3G services; by Vodafone Germany related to growth of the German mobile market and the level of customer usage, and to the impact on revenue and ARPU from new service offerings and 3G services; by Vodafone Japan related to the effect of its turnaround program on its handset and service offerings, including the offering of new handsets, its network coverage and performance and the growth of its customer base; to the impact on partnerships on its revenue, to its ability to produce new products and improve existing products such as Vodafone live! and its ability to expand its 3G content portfolio; to Vodafone UK related to its commercial strategy and the addition of new services, including services such as Vodafone Simply; by Vodafone Germany related to growth of the German mobile market and the level of customer usage, and to the impact on revenue and ARPU from new service offerings and 3G services; and by Vodafone Italy related to the growth of its market share and its revenues, to its competitive position in the market, to its ability to expand 3G services, including Vodafone live! Music and TV services, to maintain low maintenance costs and to its profitability in the migration towards 3G services.

The presentation also contains other forward-looking statements including statements with respect to Vodafone's expectations as to the launch and roll-out dates for products and services, including, for example, 3G services, including product offerings facilitated by the availability of 3G, mobile data applications, data and non-data services and video and Vodafone's offered business services; intentions regarding the development of products and services introduced by the Group globally or on a regional basis and intentions regarding the future development of services in relation to email solutions, connectivity, mobile network coverage, development and impact of new mobile technology, including the expected benefits of 3G; expansion of the geographic coverage of the network and the timing of the evolution of 3G to include new standards and protocols, such as HSDPA and HSUPA, and the technological enhancements and related customer benefits and service offerings in connection with the evolution of the core network and demand for such services; the ratio of capital expenditures to sales; implementation of commercial strategies targeted to each region and perceived advantages in such region; growth in customers and usage, including improvements in customer mix and user penetration; the ability to integrate operations throughout the Group in the same format and on the same technical platform and the ability to be operationally efficient; the expected accounting treatment arising from the adoption of IFRS by the Group; mobile penetration and coverage rates; future performance, including turnover, ARPU, cash flows, costs, capital expenditures, operating expenditures and improvements in margin, non-voice service and their revenue contribution; the anticipated effect on profitability of the One Vodafone global integration programme; ability to be the mobile market leader; overall market trends and other trends projections. 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These factors include, but are not limited to: changes in economic or political conditions in markets served by operations of the Group that would adversely affect the level of demand for mobile services; greater than anticipated competitive activity requiring changes in pricing models and/or new product offerings or resulting in higher costs of acquiring new customers or providing new services; the impact on capital spending from investment in network capacity and the deployment of new technologies, or the rapid obsolescence of existing technology; slower customer growth or reduced customer retention; the possibility that the technological, financial or competitive demands made by the Group’s requirements; changes in the projected growth rates of the mobile telecommunications industry; the Group’s ability to realise expected synergies and benefits associated with 3G technologies and the integration of our operations and those of recently acquired companies; future revenue contributions of both voice and non-voice services offered by the Group; lower than expected impact of 3G, Vodafone live!, the Group’s business offerings and other new or existing products, services or technologies on the Group’s future revenues, cost structure and capital expenditure outlays; the ability of the Group to harmonise mobile platforms and any delays, impediments or other problems associated with the roll-out and coverage of 3G technology and services and Vodafone live! and the Group’s business or service offerings as well as other new or existing products, services, technologies or new markets; the ability of the Group to offer new services and secure the timely delivery of high-quality, reliable 3G handsets, network equipment and other key products from suppliers; greater than anticipated prices of new mobile handsets; the ability to realise benefits from entering into partnerships for developing data and internet services and entering into service franchising and brand licensing; the possibility that the pursuit of new, unexpected strategic opportunities may have a negative impact on one or more of the measurements of our financial performance; any unfavourable conditions, regulatory or otherwise, imposed in connection with future acquisitions or dispositions; changes in regulatory framework in which the Group operates, including risk of non-compliance; the possibility that the Group may not be able to enter into partnerships or other arrangements which the Group considers to be in its best interests; the possibility that the Group may not be able to enter into partnerships or other arrangements which the Group considers to be in its best interests; the ability to develop competitive data content and services which will attract new customers and increase customer usage; the impact of legal or other proceedings against the Group or other companies in the mobile telecommunications industry; the possibility that the Group’s marketing campaigns or efforts are not an effective expenditure; the possibility that the Group’s integration efforts do not increase the speed to market for new products or improve the cost structure of the Group’s businesses by creating economies of scale and scope; the impact of competition on exchange rates, including foreign currency transactions; the ability of the Group to restructure any investment in businesses or other companies; the Group’s ability to manage adverse conditions and risks, including those related to the acquisition of certain investments; the impact of new marketing campaigns or efforts on the Group’s results of operations; and, the risk that the Group may not be able to introduce new products, services, network or other enhancements.

Furthermore, the results of a review of the reasons why actual results and developments may differ materially from the expectations disclosed or implied within forward-looking statements can be found under "Risk Factors" contained in our Annual Report with respect to the financial year ended 31 March 2005. All subsequent written or oral forward-looking statements attributable to Vodafone or any member of the Group or any officer or employee of Vodafone or any of its subsidiaries speaking on behalf of any other member of the Group or any officer or employee of any of its subsidiaries are expressly qualified in their entirety by the factors referred to above. No assurances can be given that the forward-looking statements in this document will be realised. Neither Vodafone nor any of its affiliates intends to update these forward-looking statements.