Instructor Info - Andreas Antonopoulos

**Education**
MBA, 2001, Weatherhead School of Management, Case Western Reserve, USA
Ph.D., 1997, Electrical & Electronic Engineering, University College London, UK.
M.Eng, 1994, Electrical & Electronic Engineering, University of Patras, Greece.

**Currently**
University of New York in Prague, Rector and Professor of Telecoms Business and Entrepreneurship
Working Knowledge, Co-Founder and Managing Partner
Marathon Invest, Co-Founder & Board of Directors
Viva Credit, Angel Investor & Board of Directors
University College London, Adjunct Professor

**Background**
- Combination of Industry, Entrepreneurial, Academic background.
- 20 years in the telecom industry
- Employed in Industry at RHK (now Ovum), Bell Labs/Lucent Technologies, Nortel Networks and British Telecom
- Employed in Academia at UNYP, CEU Business School, University College London
- Consultancy work with 30+ companies (via Working Knowledge)
- Worked and/or lived in Argentina, Brazil, Germany, Greece, Hungary, the Philippines, Romania, Singapore, Spain, Thailand, UK and the US
- Have taught/guest lectured at 9 Universities
Presentation Coverage

- Global Telco Market – An Industry in Transformation
- Market Challenges
- New Technologies, Services, Opportunities & Entrepreneurship
Global Telecoms Industry

- $3Trillion+ global industry
- 4%-7% annual growth range
- High Hundreds of thousand telecom related companies worldwide
- The majority serves SPs which are the interfaces to the end customers
- Complex picture and relations between all these companies
## Leading 30 Players

<table>
<thead>
<tr>
<th>Company</th>
<th>USD Annual Revenue (b)</th>
<th>Currency</th>
<th>USD Annual Revenue (b)</th>
<th>Local Currency Annual Growth</th>
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<tbody>
<tr>
<td>AT&amp;T Inc</td>
<td>123.2</td>
<td>USD</td>
<td>123.2</td>
<td>-0.1%</td>
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<tr>
<td>NTT</td>
<td>107.6</td>
<td>JPY</td>
<td>10,249.9</td>
<td>-3.8%</td>
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<tr>
<td>Verizon Communications</td>
<td>105.4</td>
<td>USD</td>
<td>105.4</td>
<td>0.1%</td>
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<tr>
<td>Deutsche Telekom</td>
<td>87.2</td>
<td>EUR</td>
<td>64.5</td>
<td>5.1%</td>
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<tr>
<td>Telefónica</td>
<td>76.4</td>
<td>EUR</td>
<td>56.6</td>
<td>-1.6%</td>
</tr>
<tr>
<td>France Télécom</td>
<td>70.0</td>
<td>EUR</td>
<td>51.8</td>
<td>-3.0%</td>
</tr>
<tr>
<td>China Mobile Communications</td>
<td>66.6</td>
<td>RMB</td>
<td>456.1</td>
<td>9.3%</td>
</tr>
<tr>
<td>Vodafone Group</td>
<td>66.2</td>
<td>GBP</td>
<td>42.0</td>
<td>11.7%</td>
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<tr>
<td>Telecom Italia</td>
<td>38.8</td>
<td>EUR</td>
<td>28.7</td>
<td>-5.5%</td>
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<tr>
<td>KDDI</td>
<td>36.6</td>
<td>JPY</td>
<td>3,473.3</td>
<td>-3.8%</td>
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<tr>
<td>BT Group</td>
<td>32.9</td>
<td>GBP</td>
<td>21.3</td>
<td>1.0%</td>
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<td>Sprint</td>
<td>32.8</td>
<td>USD</td>
<td>32.8</td>
<td>-11.4%</td>
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<tr>
<td>China Telecom</td>
<td>32.2</td>
<td>RMB</td>
<td>204.1</td>
<td>11.3%</td>
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<tr>
<td>Softbank Corp</td>
<td>28.3</td>
<td>JPY</td>
<td>2,693.3</td>
<td>-1.7%</td>
</tr>
<tr>
<td>America Movil</td>
<td>28.3</td>
<td>MXN</td>
<td>382.0</td>
<td>13.8%</td>
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<tr>
<td>China Unicom</td>
<td>22.3</td>
<td>RMB</td>
<td>152.6</td>
<td>73.9%</td>
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<tr>
<td>Vivendi</td>
<td>20.3</td>
<td>EUR</td>
<td>16.0</td>
<td>12.6%</td>
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<tr>
<td>KPN</td>
<td>18.5</td>
<td>EUR</td>
<td>13.7</td>
<td>-4.7%</td>
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<tr>
<td>Telstra</td>
<td>15.5</td>
<td>AUD</td>
<td>20.5</td>
<td>2.4%</td>
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<tr>
<td>Carso Global Telecom/Telmex</td>
<td>15.3</td>
<td>MXN</td>
<td>206.2</td>
<td>4.1%</td>
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<tr>
<td>Telenor</td>
<td>15.2</td>
<td>NOK</td>
<td>100.0</td>
<td>5.7%</td>
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<tr>
<td>BCE</td>
<td>14.9</td>
<td>CAD</td>
<td>17.6</td>
<td>-0.8%</td>
</tr>
<tr>
<td>Weather Investments</td>
<td>14.6</td>
<td>USD</td>
<td>14.5</td>
<td>-3.1%</td>
</tr>
<tr>
<td>KT Corp</td>
<td>14.4</td>
<td>KRW</td>
<td>19,158.2</td>
<td>-0.9%</td>
</tr>
<tr>
<td>TeliaSonera</td>
<td>14.0</td>
<td>SEK</td>
<td>109.8</td>
<td>9.4%</td>
</tr>
<tr>
<td>Saudi Telecom Company</td>
<td>13.3</td>
<td>SAR</td>
<td>50.0</td>
<td>11.8%</td>
</tr>
<tr>
<td>MTN Group</td>
<td>13.1</td>
<td>ZAR</td>
<td>118.7</td>
<td>28.5%</td>
</tr>
<tr>
<td>OrTelemar Norte Leste</td>
<td>12.7</td>
<td>BRL</td>
<td>27.2</td>
<td>47.6%</td>
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<tr>
<td>Qwest Communications</td>
<td>12.6</td>
<td>USD</td>
<td>12.6</td>
<td>-7.1%</td>
</tr>
<tr>
<td>SingTel</td>
<td>10.3</td>
<td>SGD</td>
<td>15.2</td>
<td>-0.2%</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>1,159.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Emerging Market Novelties - Spending

- Asia Pac is steadily becoming the largest region. Was 36% of the market in 2012, up from 18% in 2000
- NA is stabilizing at 23% of spending in 2012 down from above 40% in 2000
- European market represented 25% of spending in 2000 had a similar size in 2012. Currently shrinking
- Less SPs and less manufacturers but a healthier community have emerged
Service Providers: Consolidation & M&A

- 98-04 boom&bust (greed)
  - Telia-Sonera
  - incumbents going east..
  - Americans in Pan-E
  - Alternatives one another

- 05-12 revival (need)
  - DT/MT->Maktel, Orbitel (Bulgaria)
  - FT->Amena (Spain)
  - Austrian->BTO
  - Telefonica->Czesky Telecom
  - NTL->Telewest
  - Orascom->Wind!
  - Microsoft->Skype!
  - Teledenmark sold to PE
  - Verizon->ATT
  - Verizon/ATT->VF???
Suppliers: The Rise of the Chinese Emperor

Huawei's revenues, $bn

Source: Company reports
Broadband and Wireless Are the Growth Engines in Telco

Source: Telegeography
Internet Growth

Source: TeleGeography
Internet Users

Internet Users in the World by Geographic Regions - 2012 Q2

- Asia: 44.8%
- Europe: 21.5%
- North America: 11.4%
- Latin America / Caribbean: 10.4%
- Africa: 7.0%
- Middle East: 3.7%
- Oceania / Australia: 1.0%

Source: Analysys Mason
Internet Penetration Rates

World Internet Penetration Rates by Geographic Regions - 2012 Q2

- North America: 78.6%
- Oceania / Australia: 67.6%
- Europe: 63.2%
- Latin America / Caribbean: 42.9%
- Middle East: 40.2%
- World, Avg.: 34.3%
- Asia: 27.5%
- Africa: 15.6%

Source: Analysys Mason
From 1G to 4G in 25 Years

- Voice
  - Analogue – NMT
  - Digital – GSM/GPRS from 9.6 kbps
  - IP – 3G up to 14.4 Mbit/s
  - Data – 4G 100Mbit/s

Mobile access
5 Megatrends - Telco

- Challenged and mature developed economies (US, Europe, Japan)
- Globalization of operators
- 3G/4G Network Evolution and LTE
- Technology discontinuity ongoing
- Service discontinuity started
Brazil brought forward CAPEX investment -($10B till 2014!!) due to the regulator enforced customer acquisition ban due to poor service. Over $120B planned for next decade till 2024

Bad timing since EU parents need profits for their troubled finances at home

World Cup 2014 spurred brought forward 4G spectrum auctioning in the host cities (In London Olympics (2012) demand for bandwidth was 7.0x the one in the Beijing Olympics (2008)
Challenges
International Voice Increase

INTERNATIONAL CALL VOLUMES AND GROWTH RATES

Source: TeleGeography
The Skype effect on International Minutes

WHERE DID THE GROWTH GO?: THE SKYPE EFFECT

Source TeleGeography
VoIP effect on Fixed Residential Revenues – EU Cse

Source: TeleGeography
- Traffic grows fast but price erosion keeps revenue growth down. It’s all down to price (regardless of the service “make-up”)
- Price competition will become less aggressive in a less crowded market place
Internet Traffic Growth Breakdown

Source: Analysys Mason
The ARPU Challenge

- Saturation in all developed markets
- Commodity nature of main service (voice) maintains pressure on ARPU after saturation
- Non Voice service having difficulty covering up for main voice service revenue erosion
- Sustained top line declines
Mobile Broadband

- Most of “New Services” Revenue in last 5 years has been wireless broadband
- Growing healthily
- Not the promised land though
US Wireless Data Revenues

Source TeleGeography
Wireless Data vs Voice Outlook

Data traffic has long overtaken voice traffic in the network

Data will overtake voice revenue by 2018

In US/UK by 2014
Strategic Challenges

- Consolidation/Acquisitions
- Successful Streamlining
- Revenue Migration
- Redefinition of Business Model & Services offering
- New SBUs
New Services Introduction Outlook

- Needy, strategically willing BUT financially hesitant Operators
- Supportive but not willing to develop in-house Vendors
- Significant opportunity for smaller third parties to take over content development
- “Saudi Arabia” effect
Opportunities - Wireline
Services Revenue Opportunities with Broadband

- Higher penetration rates, customer base
- Triple play, TV (head on with the cable guys)
- Pay per view/Video on demand
- Portals?
- Cloud computing
- Storage
- Telecommuting
- Distance learning
- Health services
- Managed Services
- Managed security
- Triple Play/ Quad Play

B/D of time spent online in the UK

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social networks/blogs</td>
<td>22.7%</td>
</tr>
<tr>
<td>E-mail</td>
<td>7.2%</td>
</tr>
<tr>
<td>Games</td>
<td>6.9%</td>
</tr>
<tr>
<td>Instant Messaging</td>
<td>4.9%</td>
</tr>
<tr>
<td>Classified/Auctions</td>
<td>4.7%</td>
</tr>
<tr>
<td>Portals</td>
<td>4%</td>
</tr>
<tr>
<td>Search</td>
<td>4%</td>
</tr>
<tr>
<td>Software info/products</td>
<td>3.4%</td>
</tr>
<tr>
<td>News</td>
<td>2.8%</td>
</tr>
<tr>
<td>Adult</td>
<td>2.7%</td>
</tr>
</tbody>
</table>

Source: UKOM
Services Mean Different Things to Different Players

Increased Revenue

VPN
Real time video
On-line gaming
MMS
Data back-up
Teleworking
SMS
Managed security

Tends to have higher service content

Tends to be difficult for IP networks

Canibalizes other revenue

Higher cost

Lowers cost
IP TV

IPTV SUBSCRIBERS BY COUNTRY, Q1 2012

Subscribers, Q1 2012 (m)

- China
- France
- United States
- South Korea
- Japan
- Russia
- Germany
- Hong Kong
- Belgium
- Taiwan
- Netherlands

Fight for content (sports..)
Utility Business Opportunity??

- Is this an option?
- Is this a direction?
- P/E at the gates..
Opportunities - Wireless
Services Grouping

- Social Networks
- Work
- Entertainment Edutainment Learning
- M-commerce
- Citizen Services
- Personal Time and Knowledge Management
- Personal Health & Security
- Personal Navigation
- Remote Monitoring & Control

Wireless Industry will address a much wider variety of needs

Wireless Industry focus today!
Changes in ARPU

Monthly average revenue per user (Euro) – 2003 Forecast: optimistic but showing trend

Source: Wireless Forum 2003!!!
Service Offering Opportunities - Analysts

- Truly mass market non voice services are still years ahead
- Most likely “winners” are:
  - 3G/4G internet access (which WILL accelerate voice erosion)
  - Location based & info services
  - Machine to Machine
  - m-commerce, m-banking and m-payment
  - Big Data ecosystem opportunities
  - Mobile health
  - Mobile TV & Video streaming
  - Cloud computing (albeit too competitive for telcos against IT)
  - Advertising (incl pushed against credit)
  - “3G” content (fun services)
- Regional culture variety and content innovation will be constantly redefining service winners
- No new service suite has a universal scope within the wireless customer market
Opportunity Areas – The “2020 Guys”

- Lifestyle
- Health & Wellness (check ups, info, consulting, monitoring)
- Low end and high end polarization (in product choices following income inequality)
- Full media experience (live, 3D, interaction, casual gaming, virtual worlds, HD image)
- Smaller, smarter devices and then again.. (energy saving, home automation)
- Embedded devices (sensors, RFID)
- Machine to machine
- Enterprise Mobility (home working, campus mobility, wide-area net, access to applications & info, mobile meetings)
Entrepreneurship Areas in Mobile Communications

- Mobile Health
- Mobile Payments
- Mobile Entertainment
- Location Based Services
- Machine to Machine
Thank You
Impact of Recession

Growth Rate

Original Forecast

What changed?

Annual Growth, 2008-2009

Recession - Shortfall in Subscriber Growth

Recession - Reduced Spending

Non-recession - Reduced ARPU in developing Markets
Long Term Revenue Growth

Classic Telco will inevitably end in support role

Source: Working Knowledge

Time

Revenues

Major New Service A

Major New Service B

Major New Service C

Non-Voice Existing Service Revenues

Voice Revenues
Most non voice traffic and revenue is still sms

Over 2.7 trillion sms sent in 2011. Growing nr of bearer services

Asia leads the pack in data % of ARPU but stability may demonstrate saturation point of existing non data services?

Regardless of the continuous hype about non sms data revenues little has materialized

The non-sms data revenue is highly fragmented
Harvesting Remaining Voice Opportunity

- Lifetime service…
- For incalling products already in place!
- Opportunity for outcalling
- Valuations depends on NPV of remaining voice spending. Highly dependent on depreciation assumptions..