Telco 2015
five telling years, four future scenarios
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Summary and Conclusions
Over the past decade global communications penetration and in mobile cellular telephony specifically has been phenomenal.

However, the key engines for growth - mobile cellular telephony and emerging markets expansion - have begun to stall

Telecom Services Revenue Growth 2004 - 2014

There is a long-term decline in fixed telephony (PSTN) lines and revenues

### EU5 PSTN/ISDN Lines (000s) 2004 - 2009

**France** | **Germany** | **Italy** | **Spain** | **UK**
--- | --- | --- | --- | ---
2004 | 16 | 44 | 103 | 151
2005 | 17 | 45 | 102 | 142
2006 | 17 | 45 | 97 | 136
2007 | 17 | 44 | 91 | 128
2008 | 18 | 43 | 86 | 120
2009F |  |  |  |  

-5% CAGR

### US Wireline Losses 2002 - 2006

**2002** | **2003** | **2004** | **2005** | **2006**
--- | --- | --- | --- | ---
2002 | -2,321 | -6,317 | -5,243 | -2,530 | -7,657
2003 |  |  |  |  
2004 |  |  |  |  
2005 |  |  |  |  
2006 |  |  |  |  

A decade of structural change in Telecom

Fixed-mobile substitution continues

EU 5 - Outgoing Voice Traffic
Billion minutes

PSTN  Mobile

CAGR

UK - Outgoing Voice Traffic
Billion minutes

Fixed  Mobile

CAGR

US Personal Telecom Consumption Expenditure
US$ Billion (2003-2007 CAGR)

Wireline (-4% CAGR)  Cellular (12% CAGR)

Dial-up access is in decline as connectivity shifts to broadband fuelled an expansion of xDSL, cable modem and FTTx

Source: PwC Media and Entertainment Outlook 2009-2013; IBM Institute for Business Value (IBV)
In markets with high mobile penetration, such as Europe, revenue growth and ARPU are declining.

Mobile market penetration  Europe (% pop.)

Mobile revenue Growth in EU 5

Mobile ARPU (€/month)

Source: Ronald Montagne “Telcos' views of openness”, IDATE, October 2009
However emerging markets telecom providers continue to secure growth and profits from serving low ARPU customers.

Emerging Markets mobile ARPU and EBITDA margin

Emerging Markets mobile revenue, (US$ Bn)

Source: IDATE, Bank of America/Merrill Lynch, Global Wireless Matrix 1Q09
Overall communications have increased but much of the growth in is over-the-top; traditional telco services share remain unchanged.

FRANCE TOTAL COMMUNICATIONS MARKET
(billions of call minutes and equivalents¹)

- Increased share of communication services by Internet Communication services providers
- Service are not easily monetized through traditional pricing models
- Stable use of traditional communications services

Notes: (1) An SMS/MMS or e-mail is considered as a 30 second call.

Source: Idate: Telco’s views of Openess, Digiworld Summit 2009

Source: Ronald Montagne “Telcos’ views of openness”, IDATE, October 2009
A bright spot has been the phenomenal growth of mobile broadband with the rollout of High Speed Packet Access (HSPA) networks ...

Overall, global mobile traffic has more than doubled in the past year, reaching 33 Petabytes (PB) per month in 2008, and 85 PB per month in 2009.
… driven in part by increased penetration of Smartphones and HSDPA-enabled USB keys and dongles for laptops / Netbooks

A decade of structural change in Telecom

Smartphone Sales 2007 – 2009 (Million Units)

- 2007: 122
- 2008: 151
- 2009F: 178

21% CAGR

Netbook Sales 2007 – 2009 (Million Units)

- 2007: 0.6
- 2008: 14.6
- 2009F: 28.4

588% CAGR

Source: IDATE
The explosion of mobile applications is driven by devices like iPhone and AppStores but the latter’s revenue contributions are low.

**AppStore: Downloaded and available applications**

**iPhone AppStore: A success with low revenues**
- Average Price of Application remains very low US$2.5
- Revenues from AppStore estimated to US$25m-45m
- Apple however sold 13.7m iPhones in 2008; 13% of all handsets shipped (16% in 1H of 2009)
- Apple is using the AppStore to drive demand for hardware and foster audience monetization

Source: Frédéric PUJOL, "Open Mobile", IDATE, 2009,
The cost of delivering data however is not matched by revenues as revenue and traffic volumes are decoupled in a data-dominant world.

How to improve revenue /traffic for data?

How to lower network costs for data?

Source: Nokia-Siemens; IBM Institute for Business Value (IBV) Analysis
A decade of structural change in Telecom

Telecom revenues from Telecom IPTV subscription and content services remain woefully low

Global IPTV Revenues
2005 - 2012
(US$ million)

Source: IBM Institute for Business Value (IBV) Analysis based on PwC Media and Entertainment Outlook 2009-2013. IPTV Revenues include subscriptions, VOD and multi-channel advertising based on penetration. Additionally assumes telcos secure of 5%, 10% and 20% of multi-channel advertising inventory in 2005, 2008 and 2012 respectively.
In emerging markets, however, there is growing adoption of SMS-based applications, notably public information and advisory services.

**India**

Indian operator Tata’s service ‘mKrishi’ allows farmers to send queries and receive personalized services.

**China**

China Mobile offers ‘Nong Xin Tong’ for farmers to provide news, weather information and details of farming-related government policies (50 million users).

**Uganda**

SMS Services from Grameen, Google & MTN providing agricultural advice and targeted weather forecasts, health tips, clinic finder, and Google Trader matching buyers and sellers of agricultural produce and commodities.
A decade of structural change in Telecom

... as well as money transfer and mobile payment services

New mobile economics  World economic pyramid

Philippines  South Africa

Zambia  Ghana

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Telco 2015- five telling years, four future scenarios
Network outsourcing has gathered momentum in recent years and become mainstream even among tier 1s as part of cost restructuring.

**Network Outsourcing Deals**

- Cumulative deals per year
- Deals per year

<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deals</td>
<td>6</td>
<td>21</td>
<td>32</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Cumulative</td>
<td>6</td>
<td>27</td>
<td>59</td>
<td>89</td>
<td></td>
</tr>
</tbody>
</table>

AT&T and France Telecom used to manufacture their own equipment but divested these to create Lucent and Alcatel. Now operators are giving up running their networks; what does this portend?

Early 2009, Vodafone UK signed a 7-year agreement with Ericsson to take over maintenance and operational support for Vodafone UK’s 2nd and 3rd generation radio access networks. Expects to achieve cost-efficiencies of 25% over the 7 year period.

On March 18, 2009, France Telecom-owned Orange announced a 5-years deal to outsource the management of its networks in Britain and Spain to Nokia.
Consolidation of fixed and mobile markets continues in Europe…

Mobile networks operators EU27

The number of mobile network operators peaked in 2002 after UMTS licenses had been issued. Since then, the number of MNOs decreased by almost one third.

Proposed T-Mobile UK and Orange JV will drive further European consolidation.

Fixed broadband market

France: The top three ISPs extended their subscriber market share from 76% to 93%, facing limited competition from cable.

UK: Market consolidation still under way. CPW being a major consolidator expanded its market share from 1% to 16%.

Source: IDATE, Eurostat European Commission, Ofcom * Acquired between 2005 and 2008 ** acquired in 2009 or currently being sold
A decade of structural change in Telecom

... and has gone a long way in the US already

Not exhaustive

Fixed

Mobile

Source: IDATE, operator web sites, press
The telecom industry has undergone signficant structural change over the last decade; how will it evolve over the next 5 years?

- Phenomenal expansion in communications and industry growth driven by mobile and emerging markets over the past decade has begun to stall

- While long-term PSTN decline appears inevitable, mobile penetration is peaking in most mature markets, ARPU is falling and in some advanced markets mobile revenues have even started declining

- Migration from dial-up to fixed broadband continues and while global penetration remains low, adoption rates in advanced markets are increasing steadily though not enough to compensate for PSTN losses

- Rollout of HSPA networks have driven adoption of mobile broadband helped in part by the penetration of Smartphones and HSDPA-enabled USB keys/dongles for Netbooks and are somewhat mitigating the impact of voice revenue losses

- The cost of delivering data, however, is not matched by revenues as revenues and traffic are decoupled in data-dominant world

- Much expected revenues from both mobile and fixed content services such as IPTV remain woefully low

- … although SMS-based data applications such as money transfer and mobile payment services have taken off in emerging markets

- For the first time, some telecom operators are handing over their networks to external providers (i.e. NEPs) to run/operate on their behalf

- Industry consolidation continues

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Source: IBM Institute for Value (IBV) Analysis
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Summary and Conclusions
Forces shaping the future of telecommunications in 2015

Definition:

- Describe underlying incontrovertible trends in the evolution of the communications industry
- In the absence of a major exogenous shock the degree of uncertainty about these trends is virtually nil
- These trends provide a common background and context for all scenarios
A number of forces are shaping the future of the telecommunications industry into 2015

**Usage**
- Stable demand for telecom services
- Fragmented communications
- Data services growth
- Ubiquitous seamless open access

**Services**
- PTSN declines
- VOIP migration accelerates
- Shared Comms Capabilities

**Forces Shaping Future of Telecom**

**Access**
- Ultra-low cost devices
- LTE for Mobile Broadband
- Netbook proliferation
- Smartphone

**Business Model**
- Comms becomes a feature
- Green Revenue Models
- 3rd party access/enablement

**Industry Structure & Regulation**
- New broadband infrastructure competition
- Fixed mobile barriers fade
- Termination rates converge and low
- NGA and Net neutrality

**Usage & Services**
- Basic Broadband pervasive as TV
- VOIP migration accelerates
- Shared Comms Capabilities

**Source:** IBM Institute for Business Value (IBV) and IDATE Analysis

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Mobile and broadband are emerging as critical necessities and essentials consumers are most unlikely to give after their homes

Q34: If the current economic downturn persists, which of the following are you least likely to give up?

<table>
<thead>
<tr>
<th>Service</th>
<th>Likely to give up</th>
<th>Neutral</th>
<th>Unlikely to give up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>79%</td>
<td>5%</td>
<td>16%</td>
</tr>
<tr>
<td>Mobile Phone</td>
<td>51%</td>
<td>15%</td>
<td>34%</td>
</tr>
<tr>
<td>Broadband internet Access</td>
<td>26%</td>
<td>27%</td>
<td>47%</td>
</tr>
<tr>
<td>Landline/fixed telephony</td>
<td>26%</td>
<td>13%</td>
<td>61%</td>
</tr>
<tr>
<td>Family Holiday</td>
<td>17%</td>
<td>15%</td>
<td>68%</td>
</tr>
<tr>
<td>Going Out (e.g. restaurants, bars, cinema)</td>
<td>12%</td>
<td>18%</td>
<td>70%</td>
</tr>
<tr>
<td>Pay TV</td>
<td>12%</td>
<td>12%</td>
<td>76%</td>
</tr>
<tr>
<td>Newspapers / Magazines</td>
<td>11%</td>
<td>9%</td>
<td>79%</td>
</tr>
</tbody>
</table>

Source: IBM Institute for Business Value Global Telecom Consumer Survey, 2009; N= 7722
Communications are becoming increasingly fragmented across mobile, email, VoIP, text / instant messaging and social networks.

11. How do you anticipate your use of COMMUNICATION services will change over the next 5 - 7 years?

<table>
<thead>
<tr>
<th>Service</th>
<th>Will decrease use</th>
<th>No Change</th>
<th>Will increase use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Voice</td>
<td>7%</td>
<td>49%</td>
<td>44%</td>
</tr>
<tr>
<td>Email</td>
<td>7%</td>
<td>52%</td>
<td>41%</td>
</tr>
<tr>
<td>VOIP</td>
<td>13%</td>
<td>51%</td>
<td>36%</td>
</tr>
<tr>
<td>Mobile Email</td>
<td>12%</td>
<td>53%</td>
<td>35%</td>
</tr>
<tr>
<td>Text messaging</td>
<td>11%</td>
<td>56%</td>
<td>33%</td>
</tr>
<tr>
<td>Video calls</td>
<td>14%</td>
<td>57%</td>
<td>29%</td>
</tr>
<tr>
<td>Instant Messaging</td>
<td>13%</td>
<td>58%</td>
<td>29%</td>
</tr>
<tr>
<td>Social Networking</td>
<td>14%</td>
<td>58%</td>
<td>28%</td>
</tr>
<tr>
<td>MMS</td>
<td>14%</td>
<td>60%</td>
<td>26%</td>
</tr>
<tr>
<td>Voice Conferencing</td>
<td>15%</td>
<td>61%</td>
<td>24%</td>
</tr>
<tr>
<td>Landline</td>
<td>27%</td>
<td>56%</td>
<td>17%</td>
</tr>
<tr>
<td>Postal Service</td>
<td>22%</td>
<td>62%</td>
<td>16%</td>
</tr>
</tbody>
</table>

Net % change in frequency of use:
- Mobile Voice: +37%
- Email: +34%
- VOIP: +23%
- Mobile Email: +23%
- Text messaging: +22%
- Video calls: +15%
- Instant Messaging: +16%
- Social Networking: +14%
- MMS: +12%
- Voice Conferencing: +9%
- Landline: -10%
- Postal Service: -6%

Source: IBM Institute for Business Value Global Telecom Consumer Survey, 2009; N= 7722
Use of video and other data services will grow as internet data traffic quintuples and mobile broadband consumption soars.


IDATE, IBM Institute for Business Value (IBV) Analysis

Telco 2015: Five Telling Years, Four Future Scenarios
Communications and content will become more ubiquitous with open access enabling interaction with any device, service/provider.

7. How likely are the following interaction models over the next 5 – 10 years?

<table>
<thead>
<tr>
<th>Interaction Model</th>
<th>Likely</th>
<th>Likely or Unlikely</th>
<th>Unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access content with any device (PC, TV, phone etc) from any provider</td>
<td>70%</td>
<td>28%</td>
<td>2%</td>
</tr>
<tr>
<td>Allow access/use content from other service providers</td>
<td>62%</td>
<td>32%</td>
<td>6%</td>
</tr>
<tr>
<td>Real-time inter-modal communications</td>
<td>44%</td>
<td>50%</td>
<td>6%</td>
</tr>
<tr>
<td>Multi-lingual communications with real-time translation</td>
<td>6%</td>
<td>62%</td>
<td>32%</td>
</tr>
</tbody>
</table>

"For the first time we are moving from a voice world to a visual world of messaging, emailing, internet browsing and downloading, social networking and entertainment, all experienced on the move...Ubiquity is the key in the next decade. Anywhere, anytime, any device”

Chairman’s Office, Global Telecom Provider, Europe
PSTN circuit switched lines will continue to decline although in some emerging countries there may be some growth as they catch-up.

**Global PSTN lines**

*2008 – 2014 (millions)*

- Decline in advanced markets accelerates
- BRIC turn from growth to declining market
- MEA is largely under-penetrated and has substantial catch-up potential in fixed

Source: IDATE
Increasingly VOIP is replacing fixed voice access lines…

Source: European Commission, NRAs, IDATE Analysis
...and the proportion of operator managed mobile VOIP will increase as penetration of mobile VOIP accelerates.

Source: IDATE
...and operators begin to relax their attitudes

Market leaders exploring possible revenue models:
T-Mobile / Vodafone (DE) have lifted the ban on VoIP and imposed a surcharge

Market challengers using VoIP as a means of competitive differentiation:
3 partnering with Skype

Mobile VoIP: Strategies of leaders versus challengers

Market position (shares)

Leader

Challenger

Partner with VoIP provider
Allow use with data plan
Impose a surcharge
Prohibit use of VoIP

Attitude towards mobile VoIP

Attitude not necessarily the same for MNOs operating in different countries
Mass migration to mobile VOIP however is unlikely until HSPA and LTE are deployed widely to address known limitations

**Obstacles to mass market adoption of (unmanaged) mobile VoIP on 3G networks**

- **3G to 2.5G cell handover**: while cell handover within 3G coverage zone works reasonably well (although longer handover times are clearly perceived and reported by users), handover from a 3G to 2.5G cell site does not currently work in practice with dropped sessions in nearly all cases.

- **Shortened battery duration**: current mobile VOIP solutions rely on particularly intensive processing within terminal both on call and always-on wait modes, resulting in substantially shortened battery duration.

- **Device compatibility**: while all major mobile VoIP solutions are now available on major smartphone OS platforms (Symbian, iPhone, Blackberry and Android), all sorts of cross interference issues have been reported with other applications installed (particularly carrier-customised) by early adopters, limiting widespread adoption by non-geeks.

- **Cellular network coverage and reach**: current mobile VOIP codecs at 28.8kps could theoretically work on EDGE network but user tests have shown unacceptable latency and jitter. So service availability remains confined to public Wifi and 3G network coverage areas.

**USABILITY ISSUES**

- Increased delays across all mouth to ear delay components
- Increased latency due to permanent packet retransmissions required

**AVAILABILITY ISSUES**

- **Services**

**QoS ISSUES**

- **PTSN declines**
- **VOIP migration accelerates**
- **Shared Comms Capabilities**

Forces shaping the future of telecoms >Services
Shared capabilities enabling interoperability across fragmented tools will become standard through Google Voice and initiatives like RCS.

**Rich Communications Suite RCS**

- **Interoperable** services between mobile devices and PC terminals, across different access networks
- The Enriched Call experience initially provides the capability to share multimedia content during a call.
- Enhance phone book service capabilities and presence-enhanced contacts in a network address book.
- Enhance messaging expands on traditional instant messaging to simplify and unify multiple messaging mediums and provide a richer user experience.

Google Voice also gives a user a Google Phone number that links all their phones together into one central communications network enabling:

- **One number**: a single phone number that rings all your phones
- **Free SMS**: send, receive & store text messages online
- **Block calls**: send unwanted callers straight to voicemail
- **Record calls**: record phone calls and store them online
- **Conference calls**: join several people into a single call
- **Screen callers**: hear who is calling before you pick up
- **Google voicemail**: voicemail like email
- **Voicemail transcription**: read what your voicemail says
- **Custom greetings**: vary voicemail greetings by caller
- **International calling**: low cost calls to the world
- **Notifications**: read voicemail messages via email or SMS
- **Share voicemails**: forward, embed, or download voicemails

A number of telecom operators have RCS trials already underway

**RCS Timeline**

- **2007**: RCS phase 1 specifications
- **2008**: RCS Go to Market Plan
- **2009**: Local market trials
- **2010**: RCS推向市场计划

**Countries scheduled for early RCS trials:**
- France
- Italy
- Spain
- Japan

**Shared Comms Capabilities**

Source: IDATE
Majority of households in advanced markets and urban areas of most emerging markets will have access to ‘basic’ broadband.

Global 3G Deployments

Satellite links from incumbent players and new players (e.g. Google-backed O3B) to eliminate most white spots.

Source: IDATE
In many advanced markets, broadband will be generalised with household penetration levels similar to those of Television.

Penetration of households (%)

Source: IDATE, Eurostat, US Census Bureau *includes IPTV
The race for mobile broadband appears to have been decided in favour of LTE.

Which of the following access technologies are going to be critically important to the success of your business over the next 5 -10 years?

<table>
<thead>
<tr>
<th>Access Technology</th>
<th>Critical to Success</th>
<th>Neither</th>
<th>Not Critical to Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTTx</td>
<td>71%</td>
<td>27%</td>
<td>2%</td>
</tr>
<tr>
<td>4G/ LTE</td>
<td>67%</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>3G</td>
<td>44%</td>
<td>48%</td>
<td>7%</td>
</tr>
<tr>
<td>xDSL</td>
<td>43%</td>
<td>48%</td>
<td>9%</td>
</tr>
<tr>
<td>CATV</td>
<td>27%</td>
<td>39%</td>
<td>34%</td>
</tr>
<tr>
<td>2G</td>
<td>20%</td>
<td>42%</td>
<td>38%</td>
</tr>
<tr>
<td>WiMAX</td>
<td>8%</td>
<td>38%</td>
<td>54%</td>
</tr>
</tbody>
</table>

Source: IDATE, IBM Telecom Executive Survey 2009,
One in five phones and laptops sold will be a Smartphone and a Netbook respectively - i.e. devices with mobile internet access.

Netbook vs. Laptop Sales (millions)

Source: IDATE, IBM Institute for Business Value (IBV) Analysis

Smartphone vs. Phone Sales (millions)

Source: IDATE, IBM Institute for Business Value (IBV) Analysis
The market for ultralow-cost handsets is expected to grow quickly as more than 2/3 of new subscribers come from developing countries.

Rapid growth of subscriber base and forecasted ULC handsets in emerging markets

The mobile handset market is becoming increasingly polarised between low cost handsets for emerging markets and high-end smartphones for developed regions – with the mid-range handset market being squeezed.

Handsets Increase in Complexity but Prices Continue to Decline

Fixed voice communications will be monetised largely as features of broader connectivity packages rather than as a standalone service.

### Service bundles take-up in the UK

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Fixed voice, broadband and multichannel TV</th>
<th>Fixed voice and multichannel TV</th>
<th>Fixed voice and dial-up</th>
<th>Fixed voice and broadband</th>
<th>Fixed voice</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 2005</td>
<td>14%</td>
<td>5%</td>
<td>15%</td>
<td>13%</td>
<td>9%</td>
<td>4%</td>
</tr>
<tr>
<td>Q1 2006</td>
<td>9%</td>
<td>13%</td>
<td>8%</td>
<td>12%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Q1 2007</td>
<td>13%</td>
<td>8%</td>
<td>2%</td>
<td>8%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Q1 2008</td>
<td>15%</td>
<td>2%</td>
<td>2%</td>
<td>32%</td>
<td>18%</td>
<td>18%</td>
</tr>
</tbody>
</table>

### Service bundles take-up in the Netherlands

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Fixed voice and broadband and TV</th>
<th>Fixed voice and broadband</th>
<th>Fixed voice, broadband and mobile</th>
<th>Fixed voice and mobile voice</th>
<th>Fixed voice, TV and broadband</th>
<th>Fixed voice, broadband and mobile</th>
<th>Fixed voice, TV and broadband</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2 2006</td>
<td>19%</td>
<td>10.5%</td>
<td>15%</td>
<td>5%</td>
<td>40%</td>
<td>21.5%</td>
<td>5%</td>
<td>61%</td>
</tr>
<tr>
<td>Q4 2006</td>
<td>69%</td>
<td>16%</td>
<td>0%</td>
<td>4%</td>
<td>40%</td>
<td>3%</td>
<td>4%</td>
<td>40%</td>
</tr>
<tr>
<td>Q2 2007</td>
<td>61%</td>
<td>10.5%</td>
<td>0%</td>
<td>5%</td>
<td>40%</td>
<td>5%</td>
<td>5%</td>
<td>61%</td>
</tr>
<tr>
<td>Q4 2007</td>
<td>40%</td>
<td>13%</td>
<td>15%</td>
<td>6%</td>
<td>40%</td>
<td>19%</td>
<td>5%</td>
<td>61%</td>
</tr>
<tr>
<td>Q2 2008</td>
<td>38%</td>
<td>19.5%</td>
<td>22%</td>
<td>5%</td>
<td>38%</td>
<td>13%</td>
<td>5%</td>
<td>61%</td>
</tr>
</tbody>
</table>

Operators will provide open wholesale interfaces to drive innovation on their networks

Major actors of the mobile industry are involved at different levels

APIs will be engineered to prevent fraudulent and malicious activity

Joint Innovation Lab
Development of new mobile technologies, applications and services to accelerate the commercial deployment of mobile internet services

Source: IDATE, IBM Institute for Business Value (IBV) Analysis
Telcos will enable other industries to reduce their environmental impact and in the process generate additional revenues

Balance of telcos’ internal CO2 emissions and overall CO2 savings

Systemic effects:
- Online shopping will save 6.2 million tonnes of CO2 in 2008, and will continue to grow and improve its efficiency
- Dematerialisation of products will continue to increase, as more and more delivery channels migrate Online
- Virtualized interactions will become the most significant CO2 savings contributor

Optimisation
- Telecommunications significantly reduce the carbon emissions of many industrial and logistical activities
- Paper and physical delivery are replaced by online information
- Smart power management will become an important source of savings over the period

Replacement
- Conference calls, videoconferencing and telecommuting are directly responsible for 12.6 million tonnes of saved carbon in 2008
- Videoconferencing will continue to grow its impact as solutions become more widespread within businesses and usage increases
- Telecommuting has an exponential impact on the environment allowing reduction of vehicle emissions

Source: IDATE
The boundaries between fixed and mobile will blur as an increasing number of players offer a combination of products.

- Mobile TV offerings
- Cable TV and DSL quad play offerings through MVNO agreements
- DSL and cable modem internet access
- Phone service of cable companies
- Dual and triple play offerings of unbundled carriers
- IPTV and TV content rights acquisition by telecom carriers
- Fixed Mobile Substitution (« Homezone ») offerings
- MVNO service of TV channels
- Unbundled or wholesale DSL offerings of mobile and satellite TV providers
- Mobile TV offerings
- Cable TV and DSL quad play offerings through MVNO agreements

Source: IDATE
Increasingly new infrastructure competition will come from government, municipality and local initiatives

- Where incumbents and other telcos fail to build out fiber networks, non-traditional players will step in.
- Local FttX networks driven by local players, including communities, typically adopt an open access approach.

Source: IDATE

European municipality and housing company driven FttX projects

- 2005: 93 projects
- 2009: 146 projects (x1.6)

Broadband leaders are also FttX pioneers:
- Netherlands 19
- Sweden 46
Across Europe a significant portion of FTTH deployments are local or municipal projects.

**Important FTTH municipal projects in Europe**

- **MidtVest Bredband** (2006-2012) 175M households
- **Sydfyns Intranet** (2006-2009) 30 M households
- **GlasvezelNet Amsterdam** (2006-2008) 40M households
- **KPN Glasnet Enschede** (2006-2009) 25 M households
- **Pau Broadband Country France** (2006-2011) 40M households
- **Sipperec** (2007-2008) 22 M households
- **Hafslund tele Oslo** (TBD) TBD M households
- **Lyse Tele** (2006-2009) 90 M households
- **Citynet Zurich** (TBD) TBD Million households
- **Uddevalla** (2008) 10M households
- **StokAB Stockholm** (2006-2012) 100 M households
- **M-net Munchen** (2007-2011) 200M households
- **CityNetCologne** (2007-2011) 50 M households
- **Blizznet Vienna** (2007-2009) 50M households

**Source:** IDATE, IBM Institute for Business Value (IBV) Analysis
In the Unites States the Federal Government is providing stimulus funds to local communities and organisations to expand broadband

U.S. VP Biden lists $182 million in awards for 18 projects. The projects are the first to receive part of the $7.2 billion in funds dedicated to expanding broadband access -- which includes high speed Internet connections -- into rural areas, poor neighborhoods and Native American communities.

Awardees include:

- the North Georgia Network Cooperative, which will receive a $33.5 million grant
- the Biddleford Internet Corp. which is to receive a $24.5 million grant
- North central Ohio's Consolidated Electric Cooperative, which will receive a combined grant and loan of $2.4 million
- Alaska Native Corporation, which will build out a 4G wireless network in southwestern Alaska
- a New Hampshire FTTH project
- an Arizona project to build computer centers for 84 libraries in that state.

There will be new local access competition rules as NGA is deployed but commitment to net neutrality will remain.

Existing remedies for enforcing competition in the local loop will be replaced with the deployment of next generation access technology.

Regulators will abandon commitment to net neutrality in order to stimulate investment and improve customer experience/quality of service.

Unregulated over-the-top services will be subject to the same regulatory obligations as traditional services (e.g. contributions to universal service funds).

New competition rules likely with NGA: 56% Likely, 21% Possibly, 23% Unlikely

Abandon commitment to Net Neutrality:
- 39% Likely
- 12% Possibly
- 49% Unlikely

Telcos and OTTs subject to similar regulations:
- 34% Likely
- 14% Possibly
- 52% Unlikely
In developed markets mobile and fixed termination rates will converge to symmetric, low levels

**EU**

From appeals...
- The EU put pressure on the mobile industry to significantly cut termination rates
- The Commissioner’s long term vision is to bring down mobile termination rates to levels comparable to fixed termination, i.e. ~ EUR 0.01 – 0.015 per minute

Call termination markets in the E.U. need a regulatory plumber. Over the next 3 years, I expect [...] to bring the costs for mobile phone calls down by around 70%  
—V. Reding, EU Commissioner

... to regulation
- Unsatisfied with the absolute levels and discrepancies of MTR between EU member states, the Commission presented a recommendation for voice call termination
- The Commission aims at harmonising the approaches used to fix MTR
- The Commission aims at enabling lower retail charges and putting an end to de facto subsidies from fixed to mobile operators

**US**

- MTR are generally lower than in the EU
- Operators free to negotiate rates as long as rate is symmetric
- Fixed incumbent operators typically required to set cost-based termination rates (typically less than one US cent/minute)
- Frequently no MTR charged between mobile operators and new entrant fixed operators
- RPP scheme applied for mobile users

Source: IDATE, European Commission
The world in 2015

PSTN decline accelerates and VOIP grows. Ubiquitous and seamless access models prevail with high levels of rich digital content consumption accessible from any device, platform or network. Communications remain fragmented across several tools but shared capabilities enable interoperability.

Mobile and fixed broadband become as pervasive as TV in advanced markets. The battle of mobile broadband now favors LTE. 3G penetration increases in emerging markets. A bifurcated market of devices emerges with high penetration of ultra low-cost devices in emerging markets. One in three devices in advanced markets is a high-end internet-enabled smartphone, MID or Laptop/Netbook.

Voice is monetized as a feature of connectivity. Operators provide open wholesale access and interfaces to a wide range of capabilities including connectivity, customer information and billing services, to drive traffic on networks. Communication providers benefit from environmental mitigation programs.
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Summary and Conclusions
Alongside determining trends, a number of uncertain variables with multiple contrasted outcomes will shape future industry scenarios.

**Range of uncertainties**

- Vertical vs. Horizontal Integration
- Uncertainties and Scenarios for Telco 2015
- Source: IBM Institute for Business Value (IBV) and IDATE Analysis

**Selected Critical Variables**

- Demand for voice communications
- Ultra-fast Broadband Availability
- Silo vs. unified communications
- Closed/Packaged vs. Open connectivity
- OTT vs. Network optimized content
- Network sharing vs. Outsourcing
- New Verticals
- Vertical vs. Horizontal Integration
- Machine-to-machine (M2M) communications
- User funded vs. 3rd party funded
- Premium /Enriched Connectivity
- Regulatory Uncertainty
Dominant themes across selected critical variables - addressable market growth and the dominant industry model ...

Addressable Market/Growth Areas

- Demand for Voice communications
- Silo vs. unified communications
- OTT vs. Network optimized content
- New Verticals
- Machine-to-machine (M2M) communications

Industry / Integration Model

- Premium / Enriched Connectivity
- Ultra-fast Broadband Availability
- Closed/Packaged vs. Open connectivity
- Network sharing vs. Outsourcing
- Vertical vs. Horizontal Integration
- User vs. 3rd Party / ad funded
- Regulatory Uncertainty

Source: IBM Institute for Business Value (IBV) and IDATE Analysis
…provide the dimensions that define four corner scenarios within the sphere of possible futures for telecom in 2015

The major dimensions for our scenario construction are addressable market and dominant industry structure/integration model
...each with contrasted industry dynamics ...

**CLASH OF GIANTS**

- Carrier cooperation and alliances (e.g. RCS) pave way for global consolidation in response to the rising stakes from global application/content providers (Google, Microsoft, Sony etc.) or OEMs (Nokia, Apple, Ericsson)
- Mega carriers expand their markets through selected verticals (smart grid, e-health...) for which they provide packaged end-to-end connectivity
- Carriers succeed in stemming communications services revenue erosion through shared capabilities
- Few, mega carriers compete with OTT some of whom integrate backwards into the network
- Telcos develop a portfolio of premium network services (e.g. 3D TV) to deliver new digital experiences

**SURVIVOR**

- Reduced consumer spending leads to revenue stagnation or decline
- Advanced market operators have not significantly changed their voice communications/closed connectivity service portfolio and have failed to expand horizontally or into new verticals
- Investor loss of confidence for telecoms sector produces cash crisis that triggers survival consolidation

**CONSOLIDATION**

- Investor loss of confidence for telecoms sector produces cash crisis that triggers survival consolidation
- Advanced market operators have not significantly changed their voice communications/closed connectivity service portfolio and have failed to expand horizontally or into new verticals
- Investor loss of confidence for telecoms sector produces cash crisis that triggers survival consolidation

**GENERATIVE BAZAAR**

- Barriers between OTT and network providers blur as regulation, technology and competition drive open access
- Infrastructure providers (The Net Co-op) integrate horizontally and cater to multiple service providers, based on co-operative /shared risk funding model
- A myriad of asset-light service providers emerge, packaging connectivity with new services revenue models
- Pervasive affordable open connectivity are enabled for any person or object and unleash a wave of generative innovation

**MARKET SHAKEOUT**

- Under prolonged economic downturn, investors force carriers to disaggregate assets into separate businesses with different return profiles and retail brands emerge to aggregate and package services from disaggregated units
- The market is further fragmented by government/municipality and alternative provider (e.g. local housing associations or utility) initiatives to extend ultra-fast broadband to gray areas, as traditional infrastructure investment concentrates in densely populated areas
- Operators look for growth through horizontal expansion and premium connectivity services sold to application and content providers as well as businesses and consumers

**Addressable Market**

- Declining/Stagnant
- Expanding

**Competition/Integration Model**

- Concentrated/Vertical
- Fragmented/Horizontal
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Summary and Conclusions

- Scenario Characteristics
- Scenario Triggers / Realization Path
- Financial Assumptions
- Revenue and Profitability Implications
- Critical Success Attributes
Packaged communications and connectivity services dominate with minimal service innovation based on traditional revenue models

<table>
<thead>
<tr>
<th>SCENARIO CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Survivor Consolidation</strong></td>
</tr>
<tr>
<td><strong>Usage</strong></td>
</tr>
<tr>
<td>Communications are “silo’d” and fragmented across multiple but limited suppliers</td>
</tr>
<tr>
<td>Connectivity usage similar to today - personal, active, download</td>
</tr>
<tr>
<td>Consumers opt for OTT and user generated content</td>
</tr>
<tr>
<td>In emerging economies communications remains voice-centric on mobile; internet and data usage remain anecdotal and limited to large cities but some deployment of basic mobile data services e.g. mobile money</td>
</tr>
<tr>
<td><strong>Services</strong></td>
</tr>
<tr>
<td>Services are as today as telco fail to enter new industry verticals and /or expand horizontally to offer open network services to application/third-party providers</td>
</tr>
<tr>
<td>Packaged connectivity and communications services prevail</td>
</tr>
<tr>
<td><strong>Business Model</strong></td>
</tr>
<tr>
<td>User funded revenues continue to dominate and carrier revenue structure remain largely based on maintaining high ARPU across limited # of accesses</td>
</tr>
<tr>
<td>Retail driven with a multiplicity of tariff packages, including metered and bundles for different segments with an emphasis on cost control</td>
</tr>
<tr>
<td>Content is not a very dynamic market for telcos. Service providers absorb network costs from increased OTT content consumption or pass connectivity costs to users</td>
</tr>
</tbody>
</table>

Source: IBM Institute for Business Value (IBV)
Economies of scale drive integrated (fixed and mobile) model dominance and network investments are curtailed

**Scenario Characteristics**

**Survivor Consolidation**

- **Industry Structure**
  - Consolidation of declining private players in advanced markets and competition revolves usually around a limited number of large integrated players as fixed and mobile pure-plays disappear/fade
  - In emerging markets a duopoly of mobile operators is the norm
  - Emerging mobile centric giant operators from BRICs successfully gain foothold across emerging regions (Africa…) by replicating their low cost model

- **Access**
  - Ultra broadband availability is limited to 10-15% of households primarily in economically profitable areas
  - For smaller operators, active network outsourcing to NEPs and passive sharing amongst one another are sustained beyond downturn with FTTx and LTE
  - Handset subsidies remain and telecom networks are closed to unapproved devices, third-party providers or applications/services

- **Regulation**
  - As is, with ongoing regulatory uncertainty
  - NGA investment is stifled by very restrictive regulation or regulatory uncertainty
  - Operators reduce rollout speed and geographic coverage of NGA

Source: IBM Institute for Business Value (IBV)
Stagnating penetration and lack of growth/capital investment lead to investor loss of confidence and triggers survivor consolidation

### TRIGGER EVENTS / REALIZATION PATH FOR SCENARIO

<table>
<thead>
<tr>
<th>Economic and Financial</th>
<th>Investment and Technology</th>
<th>Competition and Regulation</th>
<th>Consumers and Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolonged economic downturn</td>
<td>Reduced capital expenditure</td>
<td>Increased price competition</td>
<td>Stagnating penetration levels at/near current levels</td>
</tr>
<tr>
<td>Declining/flat revenues/margins</td>
<td>Constrained access to capital/reduced capex</td>
<td>Higher wholesale/inter-connect charges</td>
<td>Inability to monetize Value-Added Services (VAS) to</td>
</tr>
<tr>
<td>Investor loss of confidence</td>
<td></td>
<td>Relaxed competition rules to encourage M&amp;A to build scale</td>
<td>Consumers cut-back spending/turn to lower cost alternatives</td>
</tr>
</tbody>
</table>

**Source:** IBM Institute for Business Value (IBV)

**Illustrated trends**

- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015

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Telco 2015 - five telling years, four future scenarios
Critical success attributes for Survivor Consolidation

<table>
<thead>
<tr>
<th>Critical Success Attributes</th>
<th>Current Capability Assessment</th>
<th>RECOMMENDATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SURVIVOR CONSOLIDATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How well operators are positioned</td>
<td>▪ Weak ▪ Moderate ▪ Competitive ▪ Strong</td>
<td></td>
</tr>
</tbody>
</table>
| Exploit fixed–mobile substitution to increase revenues /growth | ▪ ▪ ▪ | ▪ Stimulate mobile voice usage through competitive commercial packages with fixed alternatives
▪ Fixed operators acquire/partner for mobile capability
▪ Invest in fixed mobile convergence with cost synergies |
| Contain voice ARPU erosion | ▪ ▪ ▪ | ▪ Move to flat rate/ all-you-can-eat packages and bundle with other services (e.g. content / Broadband)
▪ Integrate voice with popular OTT communications services e.g. IM, social networking |
| Reduce cost to serve and preserve/ increase operation margins | ▪ ▪ ▪ | ▪ Optimize cost structures through process simplification, automation and transition to self-service
▪ Accelerate migration to converged/single core network
▪ Leverage global delivery for non-core functions |
| Secure significant fixed / mobile broadband market share | ▪ ▪ ▪ | ▪ Use handset/Netbook subsidies and long-term contracts to acquire/ lock-in mobile internet customers
▪ Bundle fixed broadband with content and voice offers at attractive prices |
| Scale (across access types and regions) | ▪ ▪ ▪ | ▪ Actively pursue in-country and regional consolidation opportunities to build scale
▪ Enhance M&A integration capability to enable rapid integration of IT, business processes and systems |

Source: IBM Institute for Business Value (IBV)
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Summary and Conclusions

- **Scenario Characteristics**
- **Scenario Triggers / Realization Path**
- **Financial Assumptions**
- **Revenue and Profitability Implications**
- **Critical Success Attributes**
Consumers have greater choice from a variety of providers /brands some of who leverage premium connectivity for new services …

### Market Shakeout

**Usage**
- Communications are “silo’d” and fragmented from a wide range of suppliers and aggregators across the value chain leveraging premium connectivity
- Users have greater choice of device/handset, services and service providers with more *ala carte* packages and online/OTT video/TV consumption increases
- In emerging markets mobile money paves the way for other simple data applications catering to specific needs of emerging markets

**Services**
- Multiplicity of tariff packages including metered and bundles that appeal to different segments supplied under a variety of market brands
- Greater focus on wholesale backbone business as well as ICT services as…
- …telcos expand horizontally to offer premium connectivity to enable content/application providers to offer own OTT content services with QoS and SLAs
- Emerging market operators focus on growing mobile data usage

**Business Model**
- User funded but wholesale driven in parts as device OEMs and application content providers leverage premium connectivity to deliver customized and vertical solutions
- Ultra-fast broadband (FTTH and LTE) offers are priced at levels comparable to broadband connectivity, encouraging rapid migration
- Open access models financed by government/ municipalities in gray/sparsely populated areas

### SCENARIO CHARACTERISTICS

Source: IBM Institute for Business Value (IBV)
...in a more fragmented market as governments/municipality and alternative providers extend ultra-fast broadband to gray areas

SCENARIO CHARACTERISTICS

**Industry Structure**
- Some tier-2 operators divest network / assets and focus on customers and brand
- Multiple service provider brands emerge to package and bundle low-cost no frills services targeted at specific consumer segments
- Major device manufacturers enter communications service provision as MVNOs in major markets
- A handful of NEPs manage networks for 50% of global telecom providers

**Access**
- Government, municipality and alternative provider (e.g. local housing associations, Utilities) broadband initiatives increase household coverage to 20-25%
- Passive infrastructure sharing becomes the norm for most operators for FTTx deployment and for 2G/3G mobile infra optimization
- Low end SIM-only, open devices and high-end devices based on exclusivity periods and strategic partnerships with OEMs, co-exist

**Regulation**
- Strong access obligations on infrastructure and strong net neutrality stance undermine investment incentives.
- Local not-for profit network initiatives provide open access

Source: IBM Institute for Business Value (IBV)
Break-up of the vertically integrated model and alternative provider, government/municipality initiatives trigger market shake-out

TRIGGER EVENTS / REALIZATION PATH FOR SCENARIO

<table>
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<tr>
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<th>Competition and Regulation</th>
<th>Consumers and Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolonged economic downturn</td>
<td>Governments/municipalities and others invest in broadband</td>
<td>Infrastructure sharing / outsourcing becomes prevalent</td>
<td>Demand services available on other provider networks</td>
</tr>
<tr>
<td>Declining/flat revenues/margins</td>
<td>Private sector capex is constrained</td>
<td>Voluntary/forced separation for efficiency or regulatory reasons</td>
<td>Consumer demand greater choice of provider</td>
</tr>
<tr>
<td>Disaggregated assets attract superior / sustainable returns</td>
<td>PE acquire under-performing behemoths and split them</td>
<td>OEMs and ACPs offer services using premium connectivity services</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brands emerge to package services from disaggregated assets</td>
<td></td>
</tr>
</tbody>
</table>


Illustrated trends

Source: IBM Institute for Business Value (IBV)

Telco 2015: five telling years, four future scenarios
## Critical success attributes for Market Shakeout

### How well operators are positioned

<table>
<thead>
<tr>
<th>Critical Success Attributes</th>
<th>Potential Capability Assessment</th>
<th>RECOMMENDATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Integrated Operators</td>
<td>Mobile Operators</td>
</tr>
<tr>
<td>Powerful brand(s) plus strategic asset (e.g. excl. device partnership, network)</td>
<td>Moderate</td>
<td>Competitive</td>
</tr>
<tr>
<td>Ultra-fast broadband coverage and optimized network delivery</td>
<td>Strong</td>
<td>Moderate</td>
</tr>
<tr>
<td>Collaboration with device OEM and application /content providers</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Open API propositions with low-priced tariffs for 3rd party services</td>
<td>Competitive</td>
<td>Competitive</td>
</tr>
<tr>
<td>Agile, flexible and reconfigurable processes and infrastructure</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

### RECOMMENDATIONS

- Leverage capabilities (e.g. devices partnerships, network quality, service innovation, no frills) to establish a distinctive reputation in market place
- Target specific brands at key customer segments

- Establish partnerships with municipalities and owners of multi-dwelling units to extend and share BB costs
- Develop deep insights into network and data usage to optimize core and access networks to reduce costs

- Define and implement common / interoperable standards and processes for collaboration
- Develop a shared platform capability to enable collaboration

- Provide standard connectivity interfaces to enable 3rd parties to leverage premium connectivity capabilities
- Develop low-cost tariff packages to enable affordable machine-to-machine connectivity across many devices

- Develop common platforms integrating technology, processes for rapid business/operating model innovation
- Leverage global delivery skills

---

Source: IBM Institute for Business Value (IBV)

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Scenario Characteristics
Scenario Triggers / Realization Path
Financial Assumptions
Revenue and Profitability Implications
Critical Success Attributes

Summary and Conclusions
Users opt for packaged integrated communication services as end-to-end OTT and network optimized digital lifestyle services co-exist

### SCENARIO CHARACTERISTICS

#### Clash of Giants

<table>
<thead>
<tr>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Users opt for leading suppliers of shared capability (presence, contact list…) aggregators across voice and online communications</td>
</tr>
<tr>
<td>- Premium network optimized services coexist with OTT content</td>
</tr>
<tr>
<td>- Significant portion of consumers purchase packaged digital content / lifestyle services from healthcare, payments, security to energy management, from carriers</td>
</tr>
<tr>
<td>- Voice services dominate in emerging market as it is extended to base of pyramid</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Carriers generate sizeable traction for packaged end-to-end solutions (connectivity+IT) for strategic verticals (e-health, smart grid…)</td>
</tr>
<tr>
<td>- Some premium network optimized entertainment services (multi sensorial, 3D, immersive reality…) are met with commercial success from differentiated and unique user experiences</td>
</tr>
<tr>
<td>- Integrated /unified communications ala Google Voice and Rich Communication Suite</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Revenue Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Communications are free for users who pay for shared capabilities</td>
</tr>
<tr>
<td>- Retail dominated. Focused on customer ownership providing end-to-end targeted services and experience based on network / customer insights</td>
</tr>
<tr>
<td>- Connectivity revenues from packaged end-to-end digital content / lifestyle services</td>
</tr>
<tr>
<td>- Emerging market operators focus on maximizing their asset utilisation by growing voice revenues through the bottom of pyramid</td>
</tr>
</tbody>
</table>

Source: IBM Institute for Business Value (IBV)
The vertical integration model prevails and some OTT players integrate backwards in a light-touch regulatory environment

### SCENARIO CHARACTERISTICS

<table>
<thead>
<tr>
<th>Clash of Giants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry Structure</td>
</tr>
<tr>
<td>- Market expansion gives rise to global carrier consolidation in response to rising stakes as OTT players integrated backwards</td>
</tr>
<tr>
<td>- Following the example of emerging region carriers, European and North American operators consolidate at regional level (e.g. 2 or 3 pan European operators)</td>
</tr>
<tr>
<td>- Some emerging market operators enter mature markets</td>
</tr>
<tr>
<td>- Active global industry alliances and standards for shared communications capabilities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Operator infrastructure sharing Next Generation Access (NGA)</td>
</tr>
<tr>
<td>- …enabling coverage of 40%-50% of households. No more than 3-4 players in market</td>
</tr>
<tr>
<td>- Operators enter strategic partnerships with selected OEMs for devices that conform to their platform architectures and standards</td>
</tr>
<tr>
<td>- Custom closed devices to support shared communications capabilities and RCS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Light-touch regulation on infrastructure to encourage infrastructure competition. No endorsement of strong net neutrality positions</td>
</tr>
<tr>
<td>- Fewer, big carriers compete with OTT.</td>
</tr>
<tr>
<td>- Telcos develop a portfolio of premium services (3D TV) but have to carry competing OTT services</td>
</tr>
</tbody>
</table>

Source: IBM Institute for Business Value (IBV)
Carrier cooperation and alliances (e.g. RCS) pave way for global consolidation in response to rising stakes from OTT providers …

TRIGGER EVENTS / REALIZATION PATH FOR SCENARIO

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</tr>
</thead>
<tbody>
<tr>
<td>Growing vibrant global economy</td>
<td>Greater access to capital and increased capex</td>
<td>Global industry consolidation</td>
<td>Increased customer adoption digital lifestyle services</td>
</tr>
<tr>
<td>Increased consumer confidence/ spending on communications</td>
<td>OTTs integrate backwards into access provision</td>
<td>OTT provider consolidation with a small # of global players</td>
<td>Greater demand for end-to-end customer experience</td>
</tr>
<tr>
<td>Investor confidence in vertical models delivering better returns</td>
<td>Providers invest in selected verticals</td>
<td>Some emerging market providers expand globally</td>
<td>Consumers demand rich communications with shared capabilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Partnerships between OEMs and content providers</td>
<td></td>
</tr>
</tbody>
</table>

Source: IBM Institute for Business Value (IBV)
### Critical success attributes for Market Shakeout

**How well operators are positioned**
- Weak
- Moderate
- Competitive
- Strong

<table>
<thead>
<tr>
<th>Critical Success Attributes</th>
<th>Integrated Operators</th>
<th>Mobile Operators</th>
<th>Fixed Operators</th>
<th>RECOMMENDATIONS</th>
</tr>
</thead>
</table>
| Scale (across access types and regions) | 🕰️ Weak | 🕰️ Moderate | 🕰️ Competitive | - Actively pursue in-country and regional consolidation opportunities to build scale  
- Enhance M&A integration capability to enable rapid integration of IT, business processes and systems |
| Deliver end-to-end network-enabled digital experiences OTT cannot replicate easily | 🕰️ Weak | 🕰️ Moderate | 🕰️ Competitive | - Leverage real-time network and customer analytics to deliver personalized experiences  
- Enable seamless interactions across access types and devices and new content experiences (e.g. 3D) |
| Vertical Industry solutions and expertise | 🕰️ Weak | 🕰️ Moderate | 🕰️ Competitive | - Build partnerships with domain expertise for selected verticals to develop and deliver solutions  
- Focus on delivering customer experience measureable by SLAs commensurate with industry expectations |
| Seamless interoperability between telecom and online communications | 🕰️ Weak | 🕰️ Moderate | 🕰️ Competitive | - Actively participate an drive inter and intra industry alliances to deploy shared communications alliances  
- Collaborate with other providers to build common infrastructure for shared communications capabilities |
| Global Integrated Enterprise | 🕰️ Weak | 🕰️ Moderate | 🕰️ Competitive | - Build global “centers of excellence” to optimize capability and delivery  
- Develop common platforms integrating technology, processes for rapid business/operating model innovation |

Source: IBM Institute for Business Value (IBV)
Contents

A decade of structural change in Telecom

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Scenario Realization, Financials and Imperatives

- Scenario Characteristics

- Scenario Triggers / Realization Path

- Financial Assumptions

- Revenue and Profitability Implications

- Critical Success Attributes

Survivor Consolidation

Market Shakeout

Clash of Giants

Generative Bazaar

Summary and Conclusions
Pervasive affordable open connectivity are enabled for any person or object, unleashing a wave of generative innovation...

**SCENARIO CHARACTERISTICS**

### Generative Bazaar

#### Usage
- Advanced users mix and match silo’d communication tools; most adopt open source shared capabilities (presence, contact list…) across voice and online communication
- Voice services continue to be paid-for on mobile but fixed communications become an embedded feature of connectivity
- Open "do it yourself" connectivity integrated/packaged by individuals/organizations
- On demand consumption of OTT digital content/services with delinearisation

#### Services
- Carriers cater to enhanced connectivity for OTT providers that deliver industry-specific solutions e.g. wellness services, energy management
- Premium connectivity (e.g. guaranteed low latency, security, CDN…) for OTT
- Local applications that meet emerging markets specificities boom
- New voice usages (e.g. human to machine for mobile internet)) lead to voice-rebirth

#### Revenue Model
- Wholesale driven with premium connectivity a key feature for revenue generation
- Carriers are able to generate premium prices for ultra broadband (FTTX, LTE)
- OTTs co-operate with network providers and pay carriage fees or share revenues in return for network optimized delivery that enhance end-user experience
- Carriers are successful in ramping M2M models to generate low ARPU on an infinite number of connected objects
- Net Co-ops leverage analytics for service providers and for cross-access and platform advertising.

Source: IBM Institute for Business Value (IBV)
in a netco / servco separation model with open devices, platforms based on open network access

**SCENARIO CHARACTERISTICS**

**Generative Bazaar**

- A co-operative of horizontally integrated infrastructure providers catering to a myriad of asset-light service providers such as VNOs, OTTs, Banks, Utilities, Governments etc.
- Horizontal model (Netco/Servco separation) and passive infrastructure sharing but no network outsourcing

**Industry Structure**

- Widespread fixed and/or mobile ultra-broadband availability with access to 60% - 80% of households
- Open devices (unlocked phones, netbooks…) dominate market as carriers retreat on handset subsidisation
- Open and standardized devices platforms supported by Net Co-ops and device manufacturers

**Access**

- Evolution to internet-style model with light-touch regulatory approach towards telcos.
- Abolition of the majority of sector-specific regulations, forcing telcos upwards the investment ladder
- Structural separation of access networks. Wholesale access to essential services (HDTV, search algorithms)
- Open Access becomes the norm.

Source: IBM Institute for Business Value (IBV)
Barriers between OTT and network providers blur as regulation technology and competition drive open access models enabled by...

**TRIGGER EVENTS / REALIZATION PATH FOR SCENARIO**

<table>
<thead>
<tr>
<th>Economic and Financial</th>
<th>Investment and Technology</th>
<th>Competition and Regulation</th>
<th>Consumers and Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing vibrant global economy</td>
<td>Increased access to capital and increased capex</td>
<td>Providers devise funding model for open access infrastructure</td>
<td>Organizations package connectivity with own services</td>
</tr>
<tr>
<td>Increased consumer confidence/ spending on communications</td>
<td>Widespread deployment of ultra-fast broadband</td>
<td>National govt. fund open infrastructure for economic growth</td>
<td>Increased use / availability of connected devices</td>
</tr>
<tr>
<td>Investors confident of higher return from open connectivity innovation</td>
<td>Providers invest in standardized service and device platforms</td>
<td>Infrastructure to services-based competition /regulation</td>
<td>Consumers want to use service from many providers</td>
</tr>
</tbody>
</table>

*Source: IBM Institute for Business Value (IBV)*
### Critical success attributes for Generative Bazaar

**How well operators are positioned**

- Weak
- Moderate
- Competitive
- Strong

<table>
<thead>
<tr>
<th>Critical Success Attributes</th>
<th>Potential Capability Assessment</th>
<th>RECOMMENDATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENERATIVE BAZAAR</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Funding model for Net Co-op / open access network infrastructure | [ ] Weak [ ] Moderate [ ] Competitive [ ] Strong | Partner with other infrastructure providers including municipalities extend ultra-fast broadband coverage  
Enable 3rd party access to premium connectivity based on open APIs  
Agree to shared/co-operative funding model for open network access |
| 3rd-Party connectivity / capabilities access and developer communities | [ ] Weak [ ] Moderate [ ] Competitive [ ] Strong | Enable 3rd party access to premium connectivity based on open APIs  
Enable access to common capabilities (Billing, SDP)  
Stimulate and support vibrant developer communities |
| Dynamic Business Design | [ ] Weak [ ] Moderate [ ] Competitive [ ] Strong | Infrastructure / processes to facilitate connectivity of a multitude of objects, sensors, devices and applications  
Build modular business architectures based on standards and flexible, common technology platforms |
| Leverage insights from connectivity, data, ecosystem to enable 3rd Party innovation | [ ] Weak [ ] Moderate [ ] Competitive [ ] Strong | Enable applications/service providers access to insights from network, data and users for innovation  
Develop deep insights into network and data usage to optimize core and access and reduce costs |
| Structurally separated network and services operations | [ ] Weak [ ] Moderate [ ] Competitive [ ] Strong | Create new operating model and organization to support structural separation  
Deploy systems, processes to support differentiated and dynamic wholesale pricing for various SLAs |

Source: IBM Institute for Business Value (IBV)

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Telco 2015 - five telling years, four future scenarios
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  Clash of Giants
  Generative Bazaar

Summary and Conclusions
Communications-connectivity substitution will increase over the next 5 years regardless but dominates revenue mix in Generative Bazaar.

2008 – 2015 Changes to Segment Revenue Mix by Scenario

**Advanced Markets**
- 2015 Revenue Mix Scenarios:
  - Survivor Consolidation: 69% Communications, 49% Connectivity, 31% Content
  - Market Shakeout: 49% Communications, 2% Connectivity, 5% Content
  - Clash of Giants: 64% Communications, 5% Connectivity, 5% Content
  - Generative Bazaar: 35% Communications, 5% Connectivity, 5% Content

**Emerging Markets**
- 2015 Revenue Mix Scenarios:
  - Survivor Consolidation: 85% Communications, 1% Connectivity, 1% Content
  - Market Shakeout: 80% Communications, 20% Connectivity, 0% Content
  - Clash of Giants: 82% Communications, 1% Connectivity, 1% Content
  - Generative Bazaar: 63% Communications, 34% Connectivity, 3% Content

**Communications**:
- PSTN Voice, VoIP/ VoBB, Mobile Voice, SMS revenues

**Connectivity**:
- Fixed Broadband, dial-up internet, legacy corporate data service, 3G/Mobile Broadband and Machine-to-Machine revenues

**Content**:
- IPTV and Mobile Content (music, video, mobile TV, games, advertising)

Summary and Conclusions
... that represents the most optimistic outlook for telecoms, relative to the IMF’s global GDP forecast fro 2010 - 2014

Global GDP vs. Telecom Services Growth Scenarios

2009 – 2015 Telecom Growth Scenarios (Stylized)

- Generative Bazaar: 5.3%
- Clash of Giants: 3.3%
- Market Shakeout: 1.8%
- Survivor Consolidation: 0.2%