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USAGE TRENDS & INFRASTUCTURE

What's going on in Dutch TMT?

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15 September 2016, Utrecht

telecompaper

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Things used to be simple …

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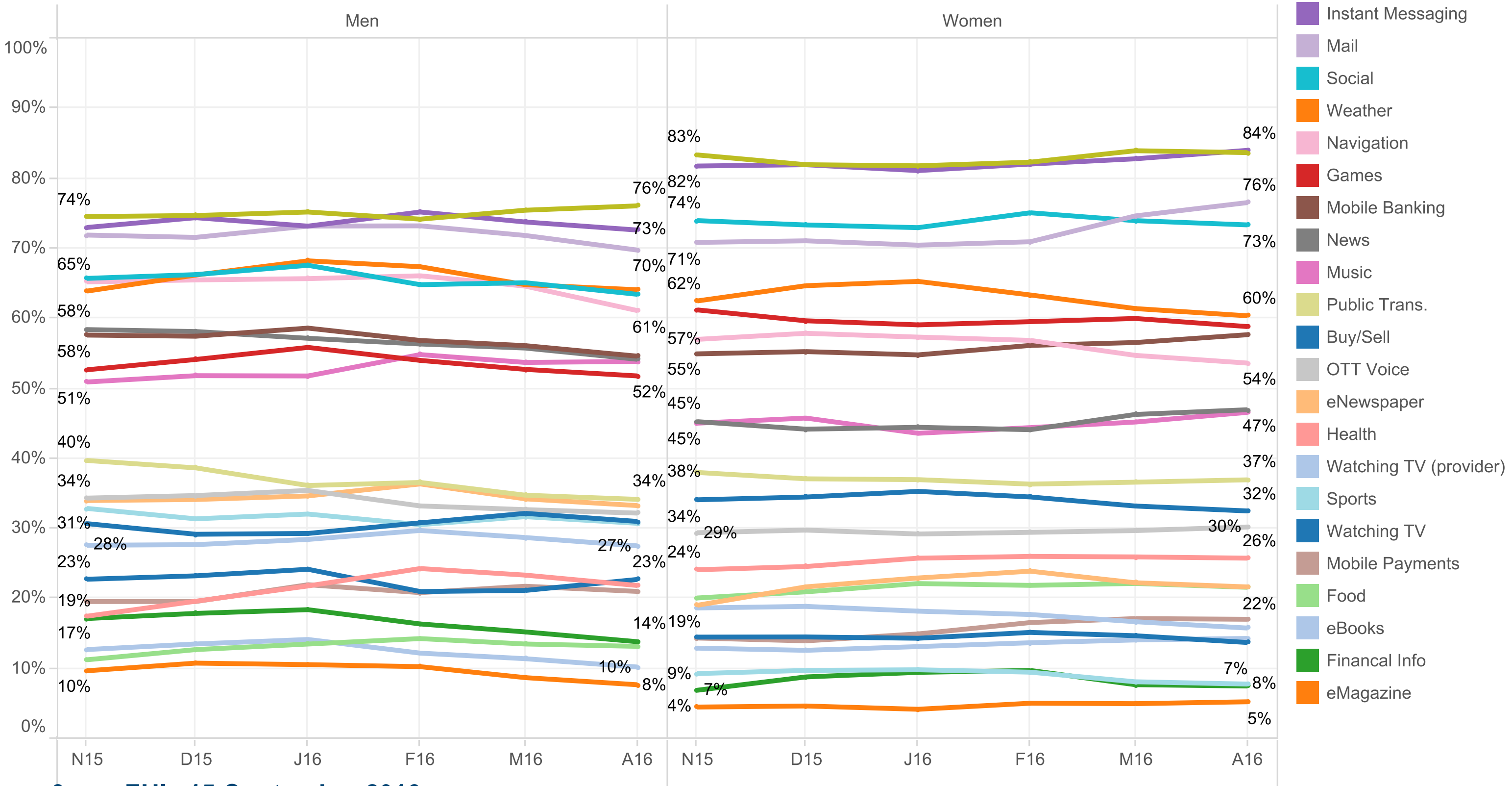
Smartphones are all over the place

Segment / All / Gender / N15 to A16



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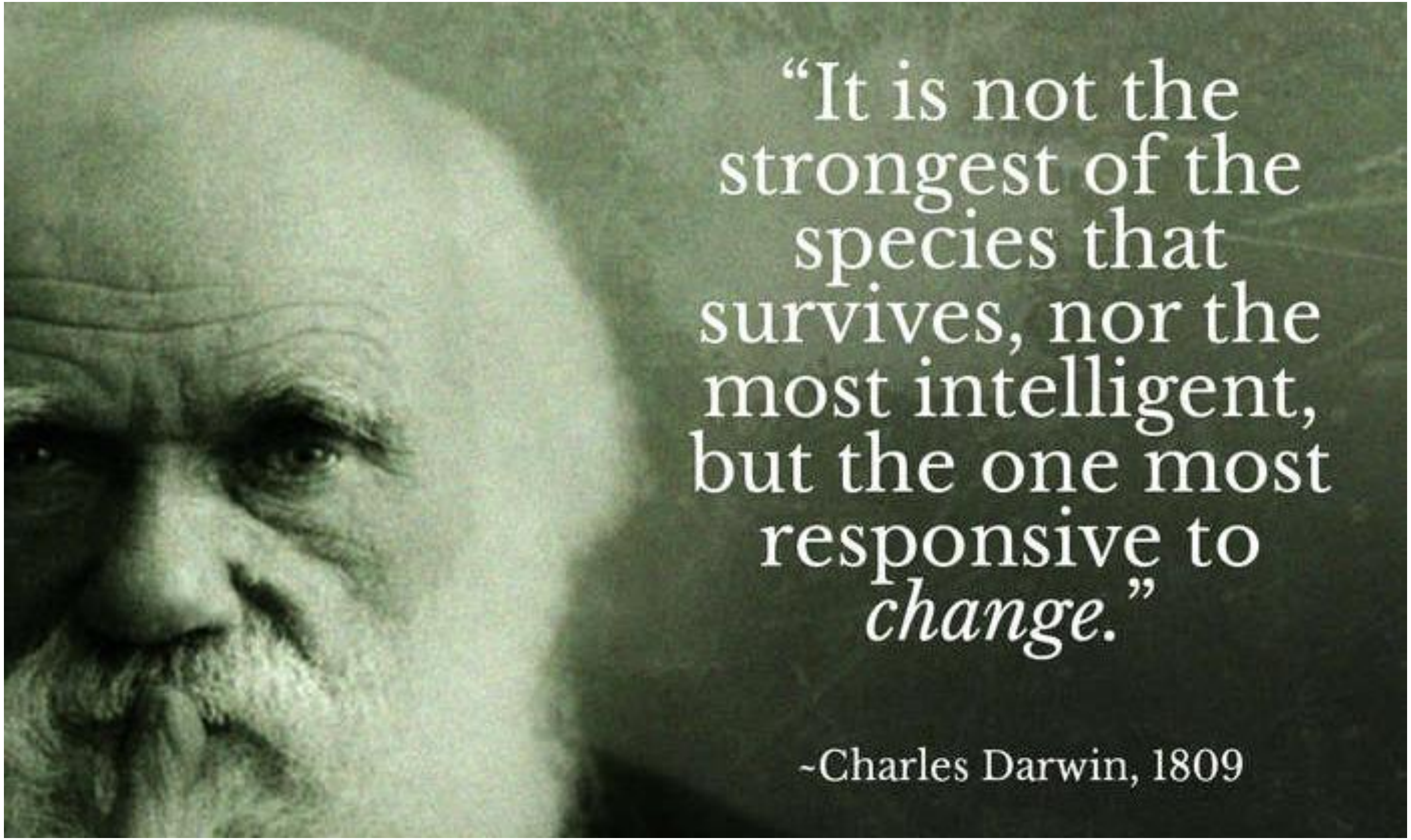
"It is not the strongest of the species that survives, nor the most intelligent, but the one most responsive to *change*."
-Charles Darwin, 1809

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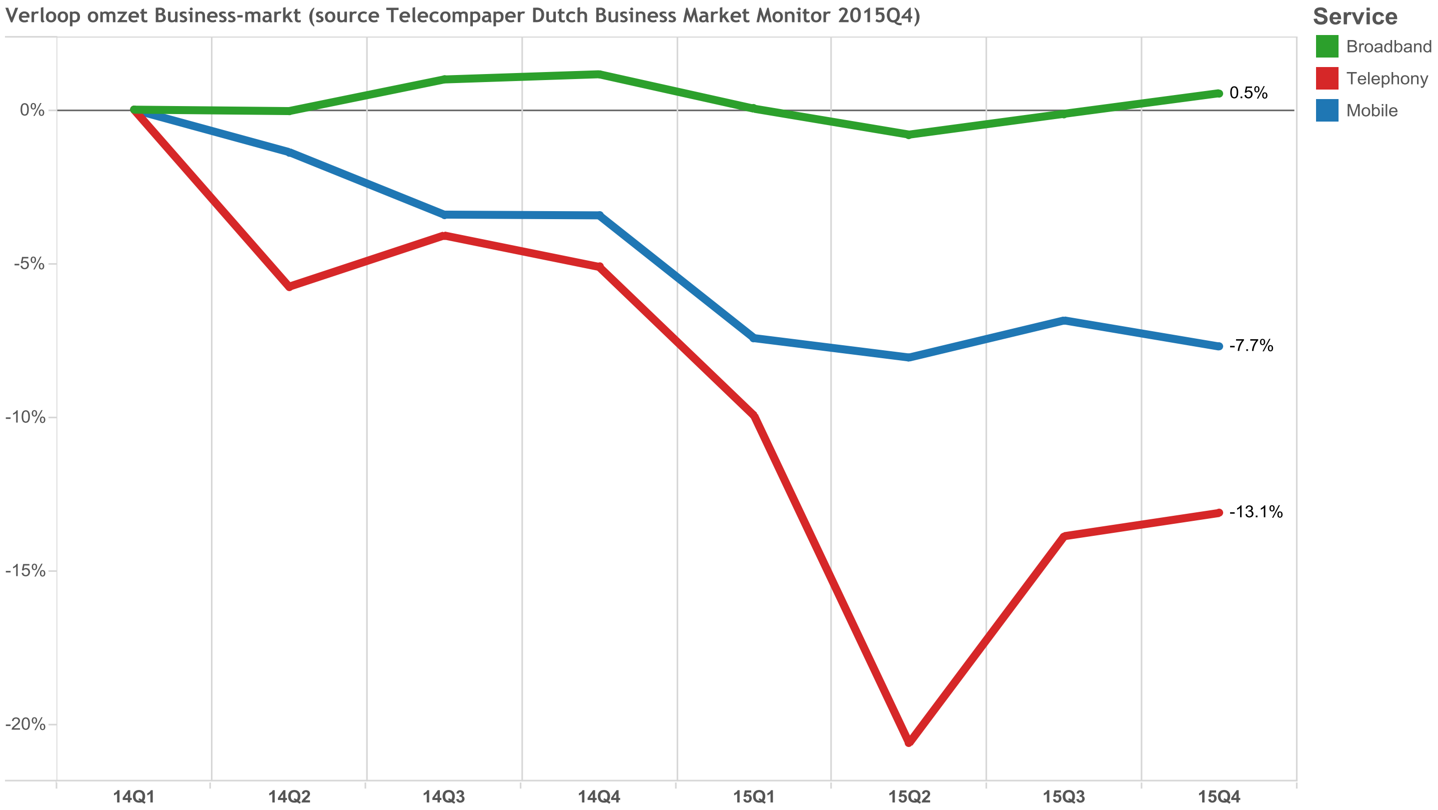
How about revenues?


Verloop omzet Business-markt (source Telecompaper Dutch Business Market Monitor 2015Q4)
Service
Broadband
Telephony
Mobile
0%
-5%
-10%
-15%
-20%
0.5%
-7.7%
-13.1%
14Q1
14Q2
14Q3
14Q4
15Q1
15Q2
15Q3
15Q4

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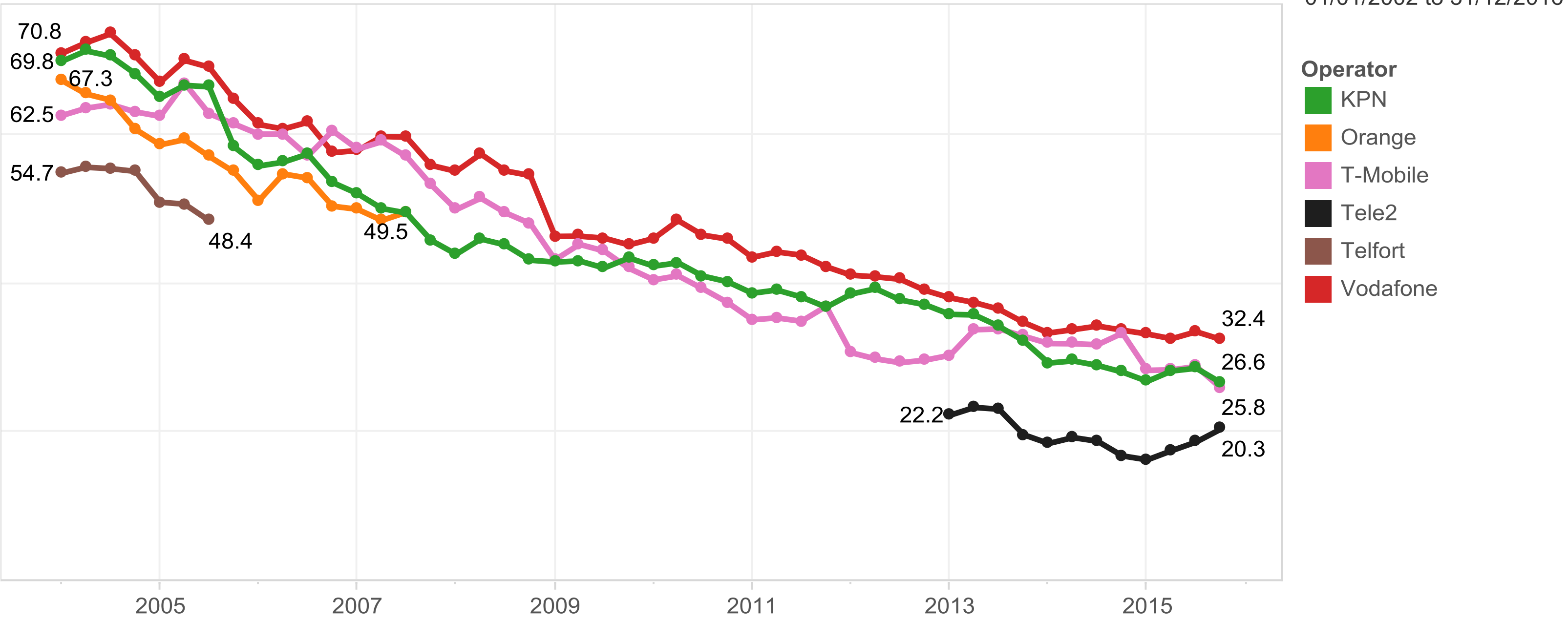
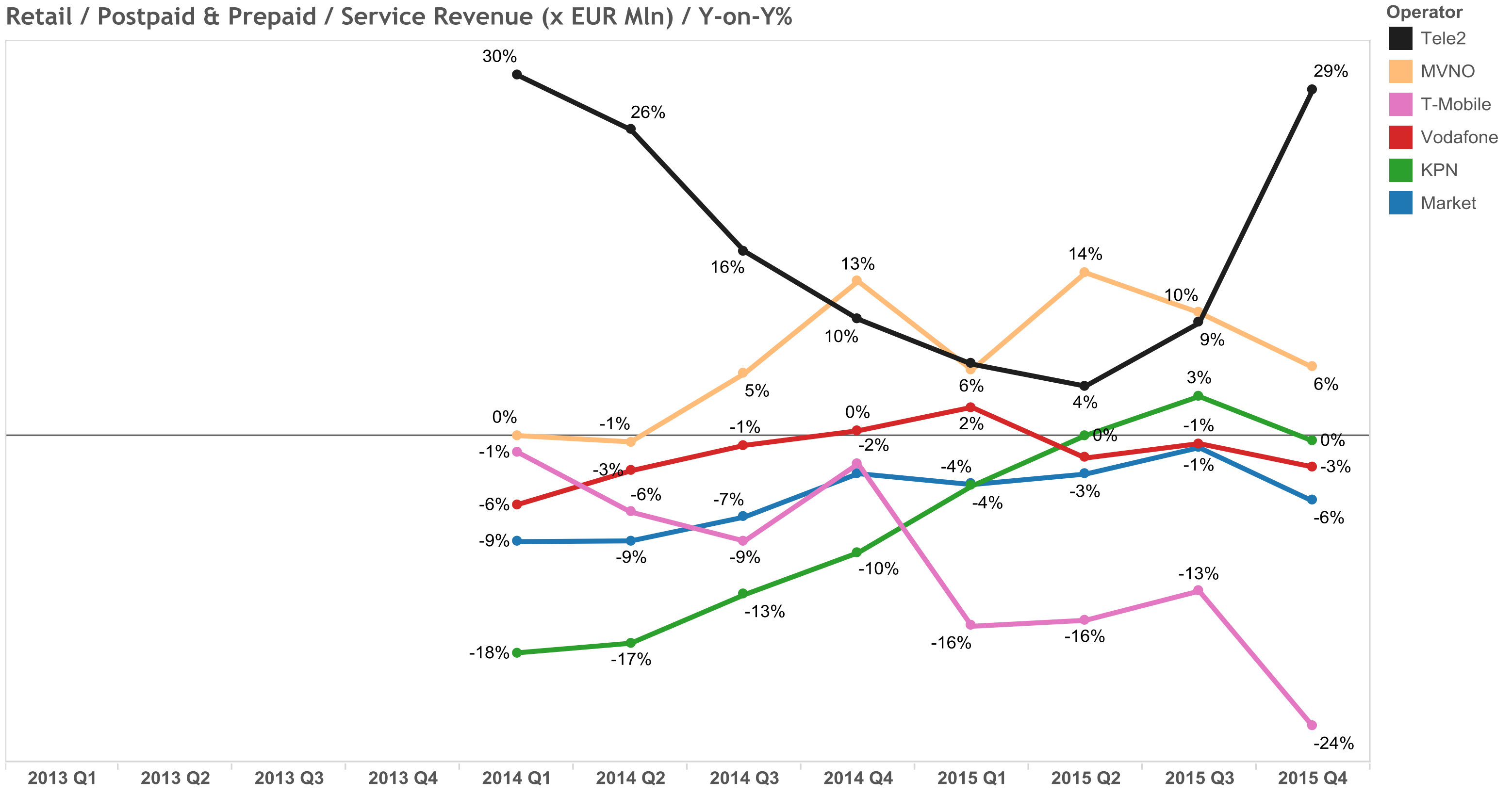
Postpaid / ARPU (x EUR)



Copyright Telecompaper 2004-2016 - The trend of sum of ARPU (x EUR) for Date Quarter. Color shows details about Operator. The data is filtered on Information, Type Customer, Product, Source and Date. The Information filter keeps ARPU (x EUR). The Type Customer filter keeps MNO. The Product filter keeps Postpaid. The Source filter keeps TP. The Date filter includes the last 15 years. The filter associated with this field ranges from 01/01/2002 to 31/12/2016. The view is filtered on Operator and Exclusions (Operator,QUARTER(Date)). The Operator filter excludes Market.

Not all created equal



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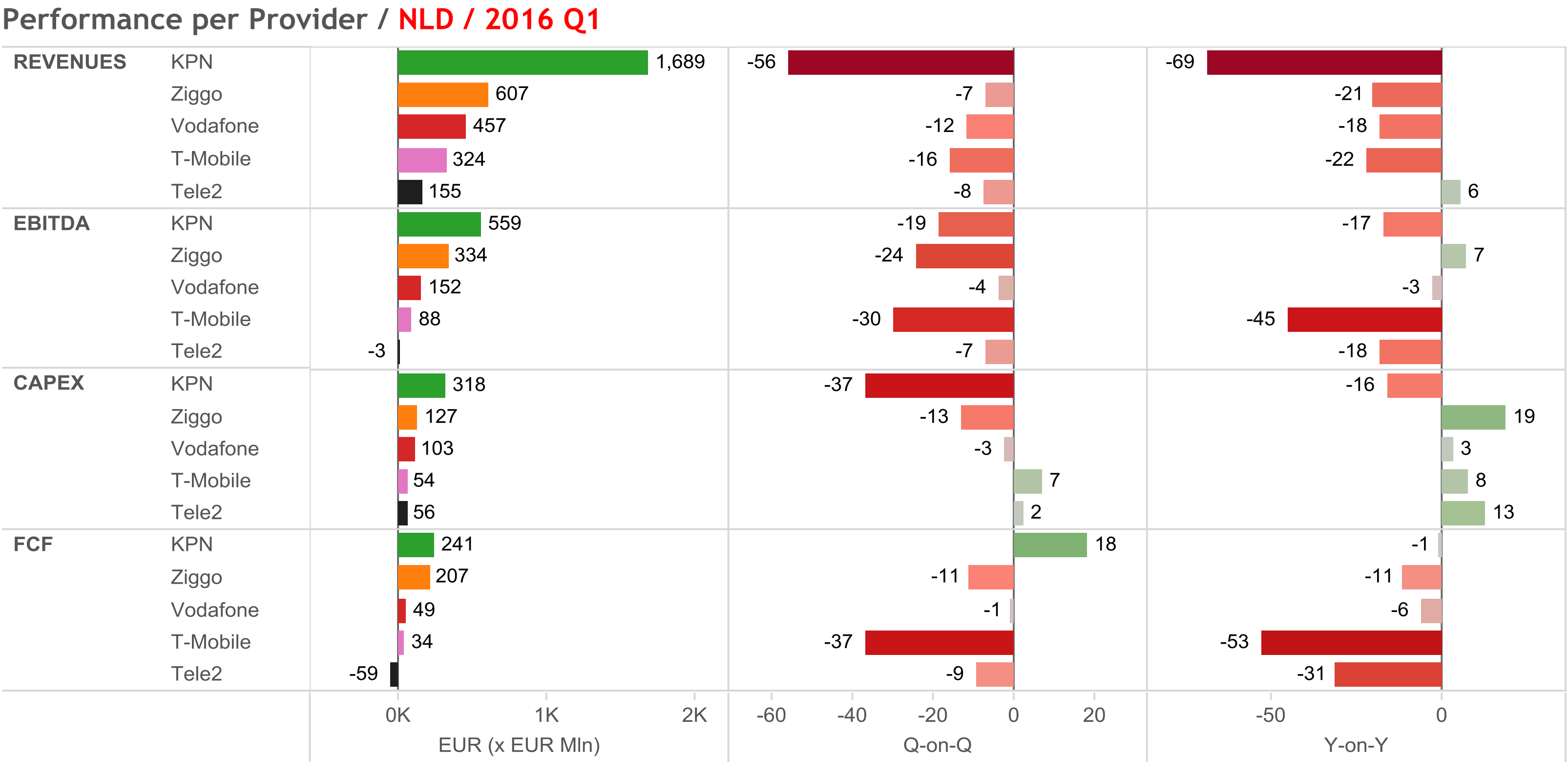
What's left for share-/bondholders?



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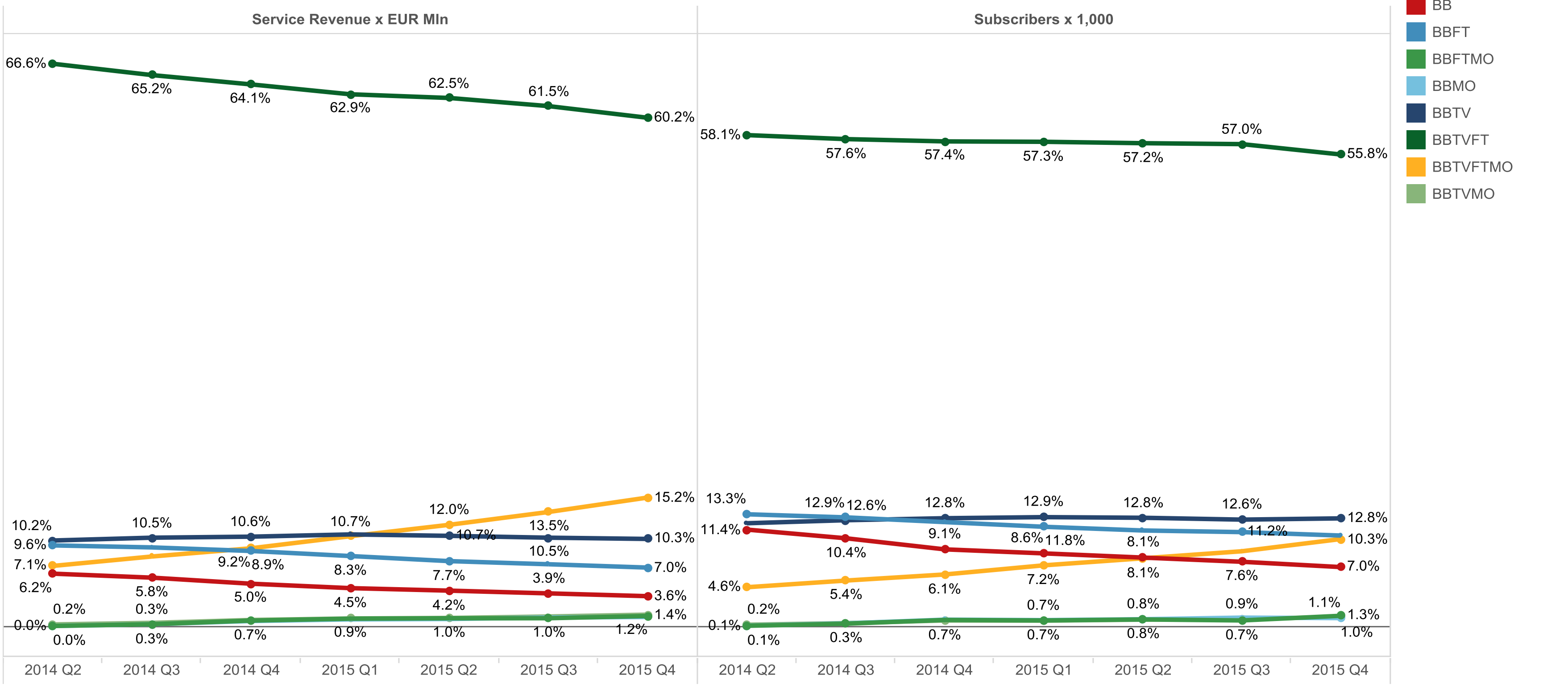
Service revenues & subscribers

1P, 2P, 3P and 1 more / All / Market share



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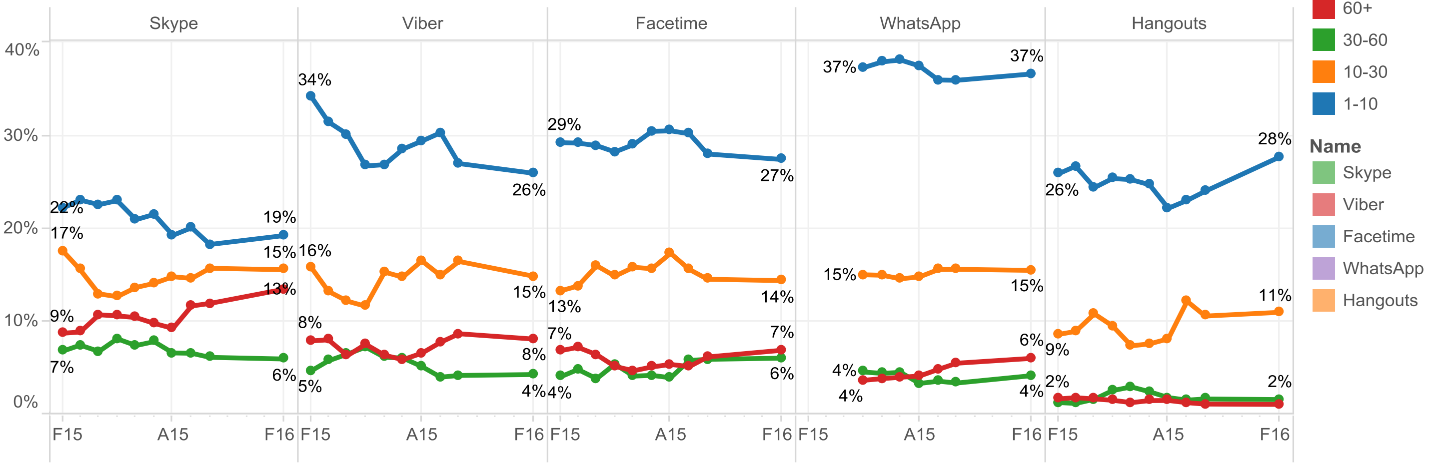
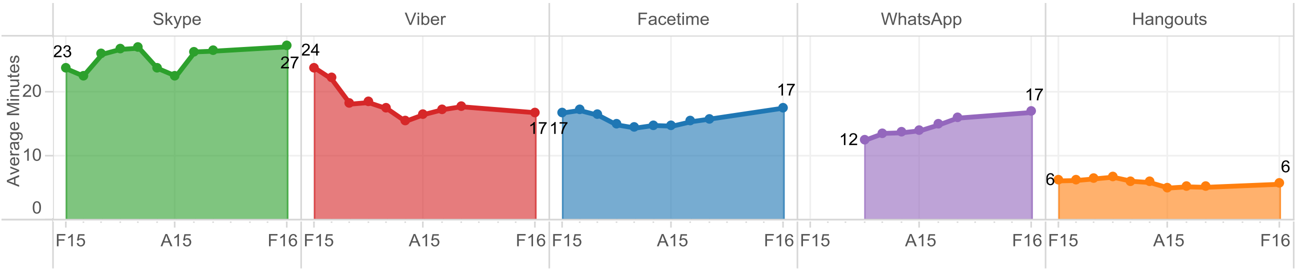
OTT voice apps

App / Minutes of Use / F15 to F16



Average Minutes



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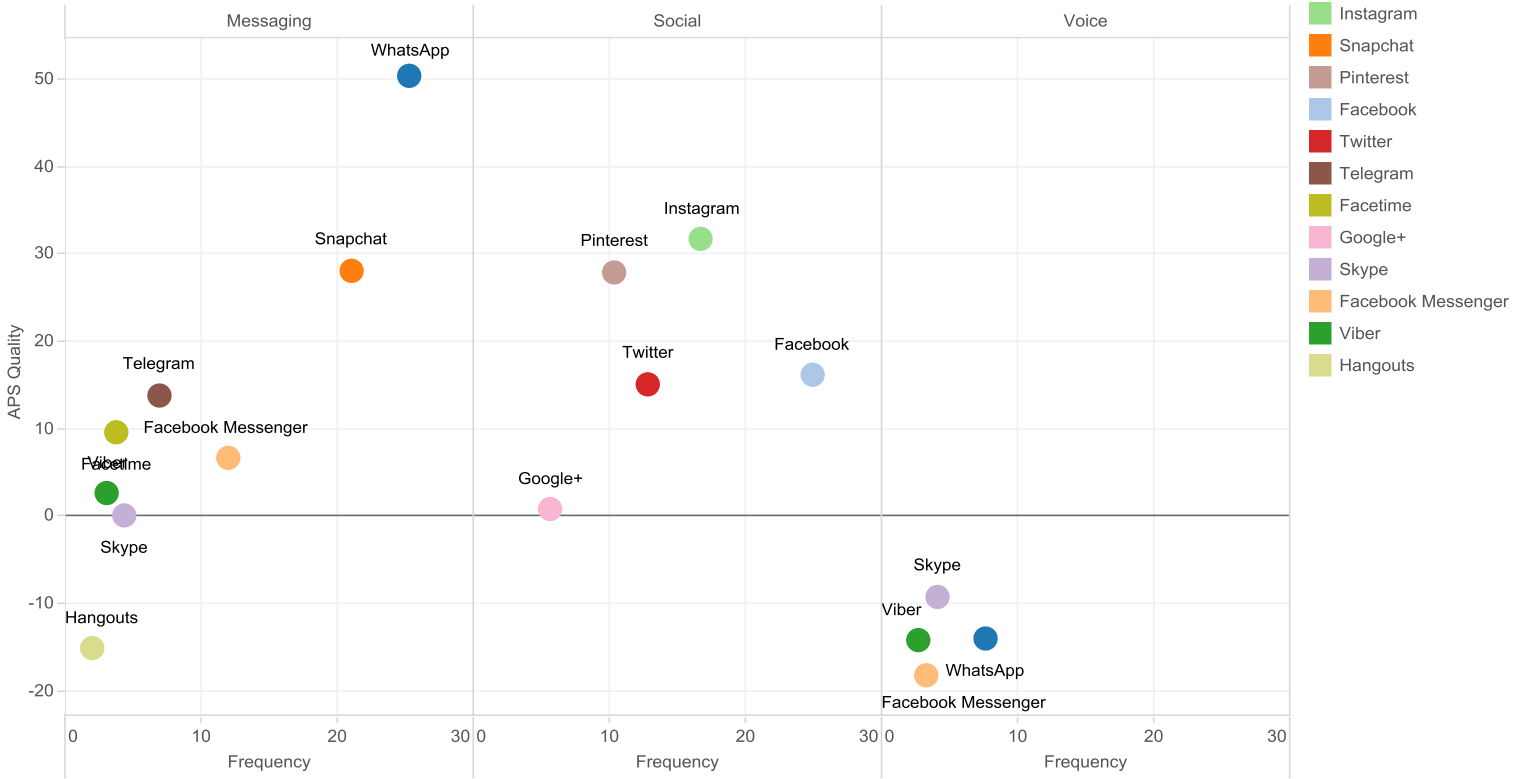
Messaging, social & voice – usage vs. quality

Use & Quality (APS) / 29 February 2016



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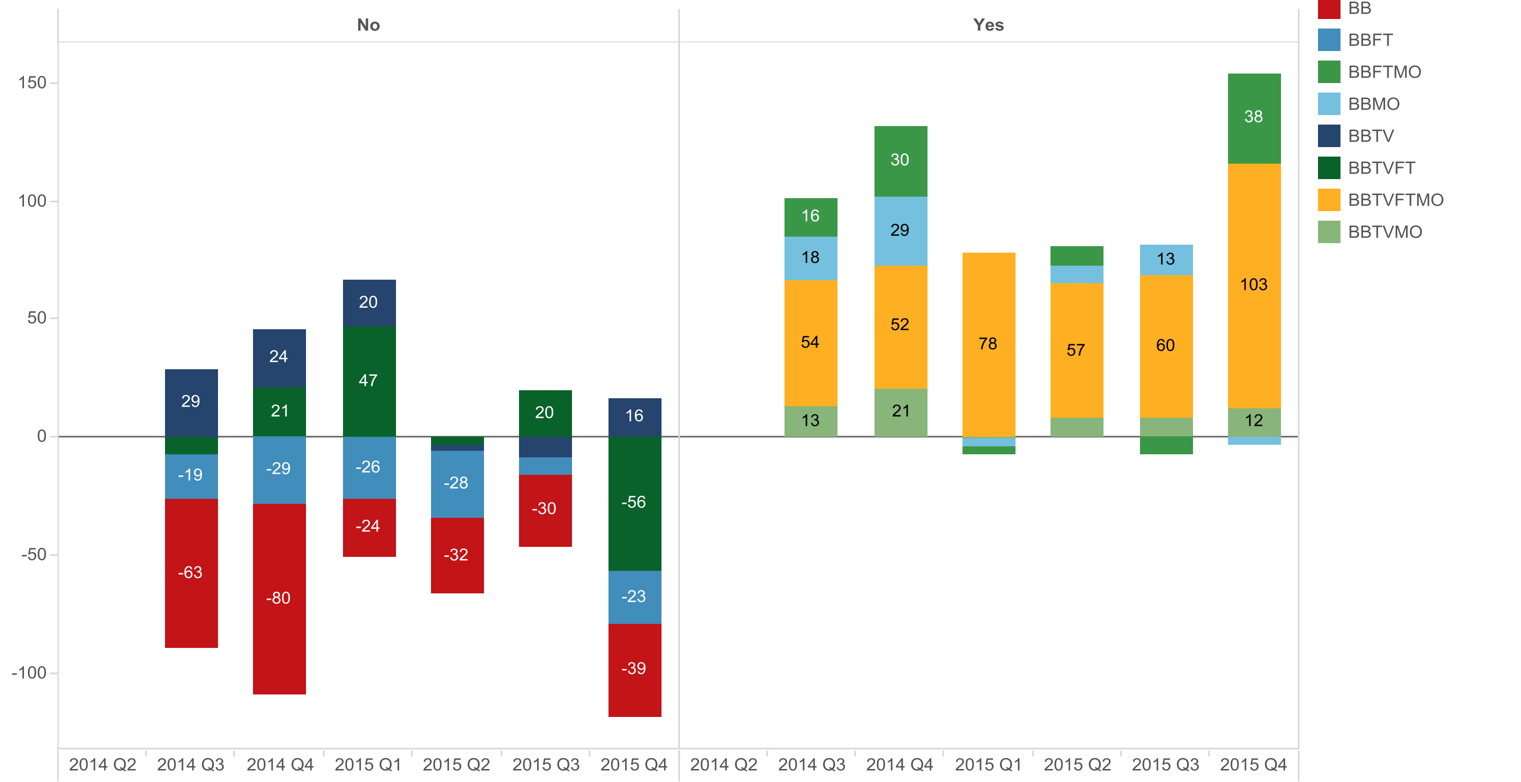
Multiplay net adds (incl. & excl. mobile)

Subscribers x 1,000 / Change Q-on-Q



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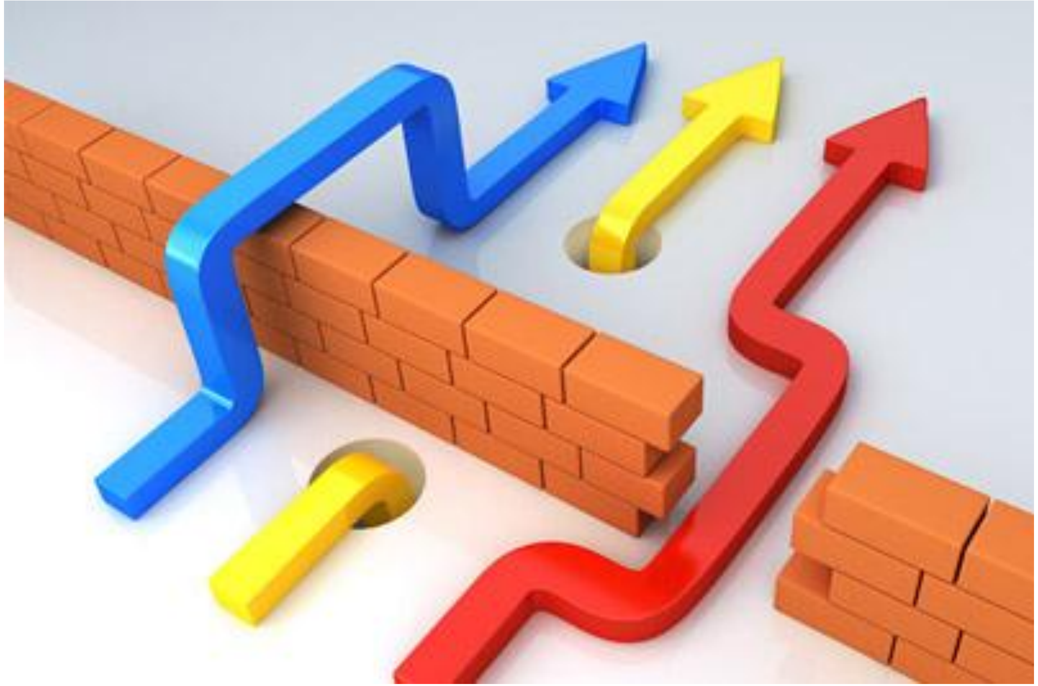
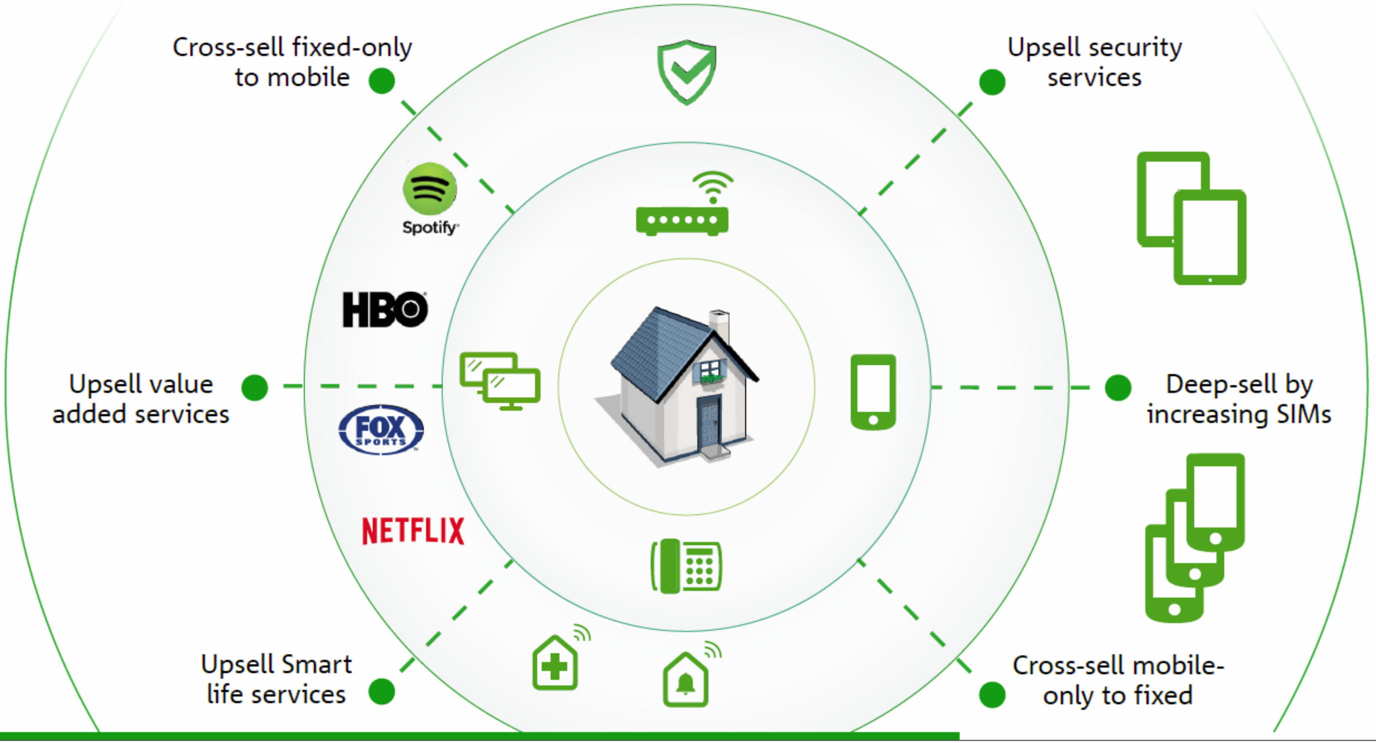
Strategic options



Household at center of service model in Consumer

Significant opportunities to increase share of wallet per household



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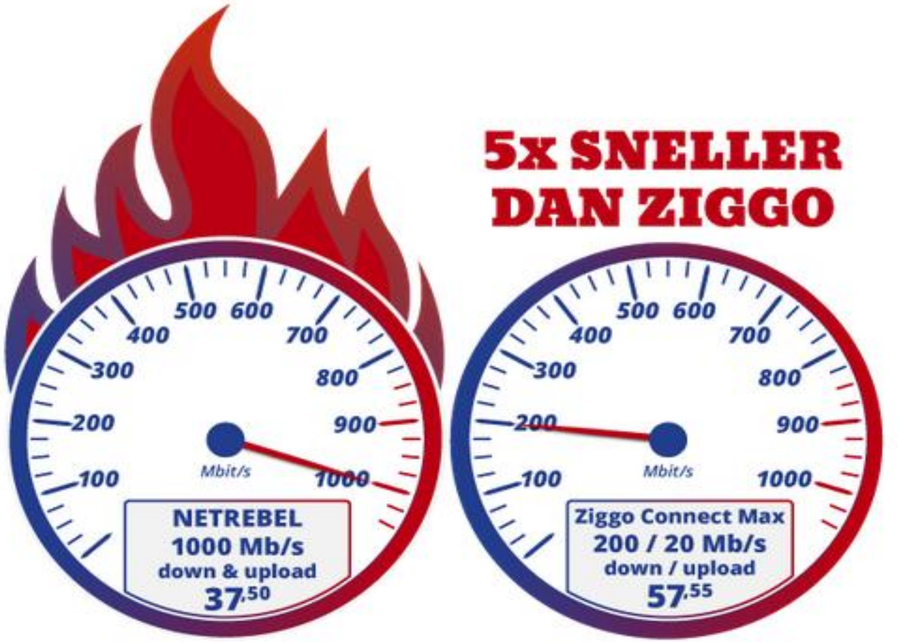
Broadband-only



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The Network

Infrastructuur

- Fixed
- Mobile
- WiFi
- Satellite
- DTT

Platforms

- Managed services
- OTT
- M2M, IoT
- Cloud
- Smart home/car/city

External environment reassuring (cont'd)

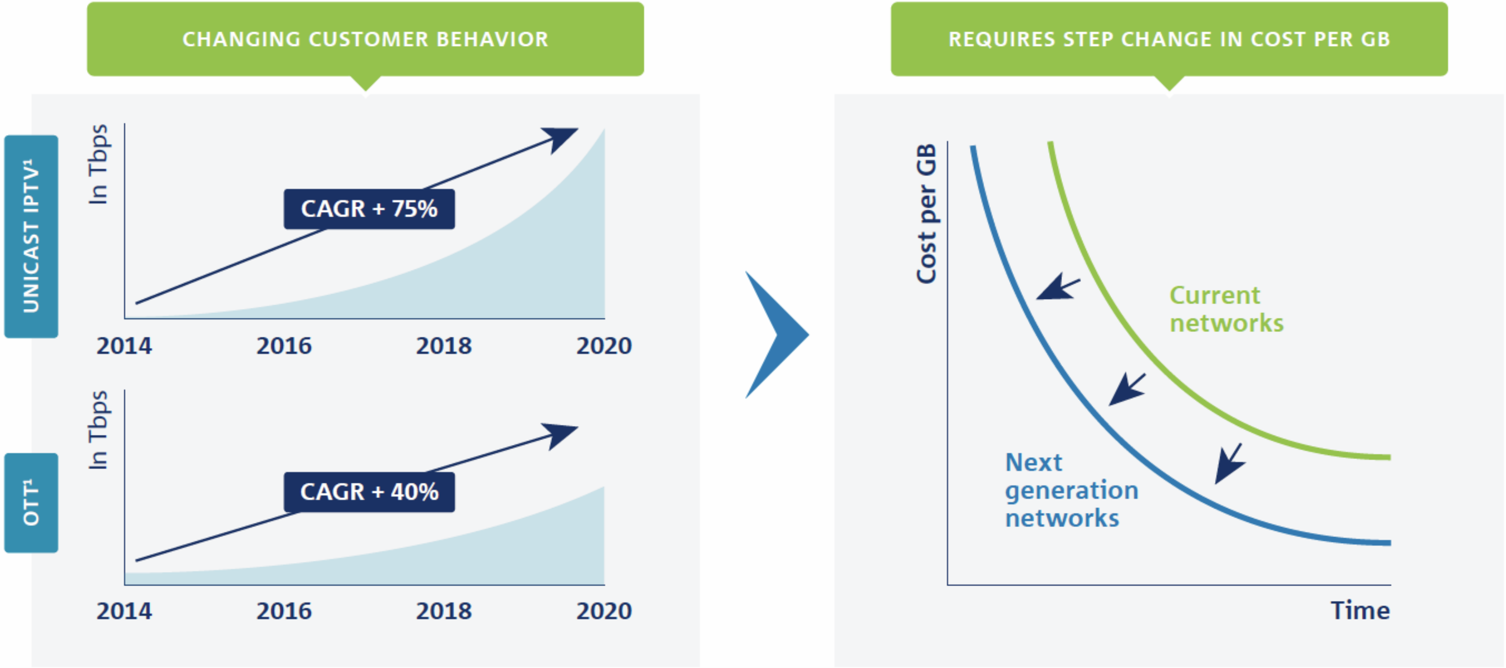
KPN strongly positioned as only integrated service provider

		Ziggo			TELE2
Fixed network	FttC, FttH	Coax	Wholesale KPN	N/A	Wholesale KPN
Broadband market share[1]	41%	43%	N/A	N/A	4%
TV product perception[2]	●	◕	N/A	N/A	◕
TV market share[1]	29%	52%	N/A	N/A	2%
Mobile network	2G, 3G, 4G	MVNO	2G, 3G, 4G	2G, 3G, 4G	4G + MVNO
Mobile network quality[3]	●	◕	◕	◑	◔
Mobile market share[4]	44%	N/A	35%	21%	N/A
Fixed-mobile convergence	◕	◔	◔	○	○
Business market presence	SME, LE, Corporate	SME	SME, LE, Corporate	SME, LE	SME, LE
Business market capabilities	●	◑	◑	◔	◑
Trusted brand	●	◕	◕	◑	◔

1 Telecompaper
2 Independent market survey (Consumentenbond; Q3 2015)
3 Independent market survey (Q4 2015)
4 Total Dutch (Consumer and Business) mobile service revenue market share

Importance of investing in the core network

Facilitating data growth, while retaining profitability



1 Management estimate

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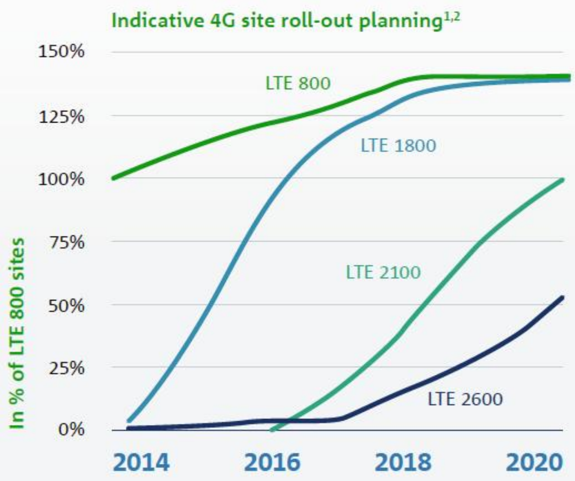
Mobile

- **Technology**
  - 4G, 5G
- **Capacity upgrade**
  - Carrier aggregation (incl. 3G, WiFi & unpaired spectrum): 4G+, LTE-A
  - Densification: small cells
  - Backhaul: FTTS
- **Platforms**
  - LTE-Vehicular
  - LTE-Broadcast
  - LTE-SDL (unpaired)
- **Convergence**
  - Fixed-line substitution
  - Hybrid LTE/DSL

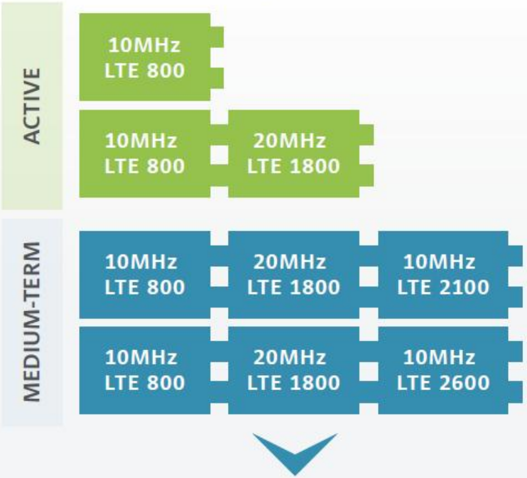
Staying ahead of demand for mobile data

Fully utilizing spectrum position for excellent customer experience

4G CAPACITY ROLL-OUT AHEAD OF DATA GROWTH



UTILIZING FULL SPECTRUM TO DEPLOY CARRIER AGGREGATION



Increasing capacity and enabling download speeds up to 400Mbps

1 Rebased to LTE 800 sites end 2014
2 Excluding small cells

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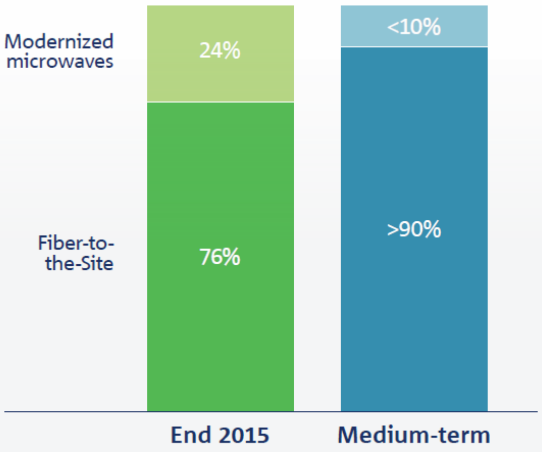
Staying ahead of demand for mobile data (cont'd)

Integrating fixed and mobile access

FUTURE-PROOF BACKHAUL CONNECTION

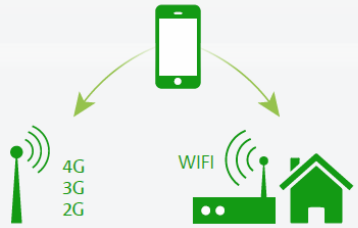


LEVERAGING FIXED NETWORK INVESTMENTS

Small cells

- Densifying mobile network
- High fiber penetration providing backhaul connection small cells

Automated WiFi access (2017)



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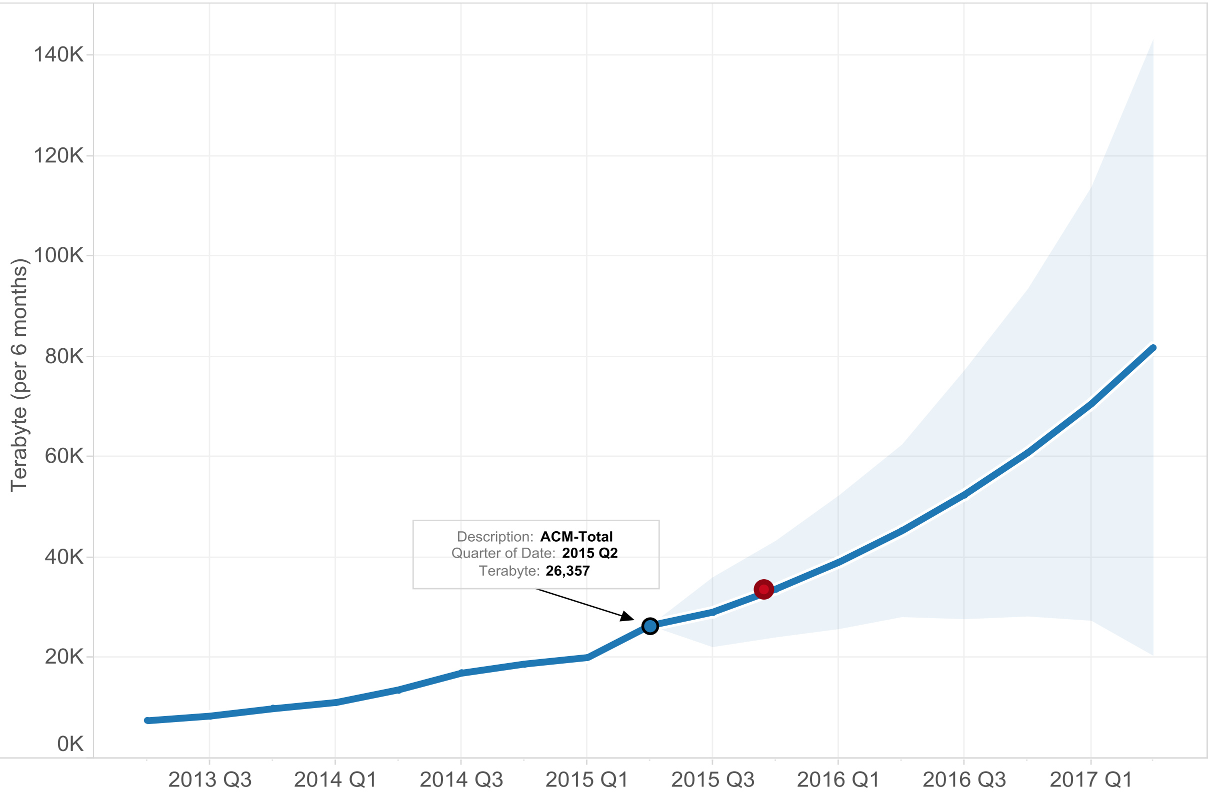
Mobile data traffic explodes



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Mobile download speeds rise

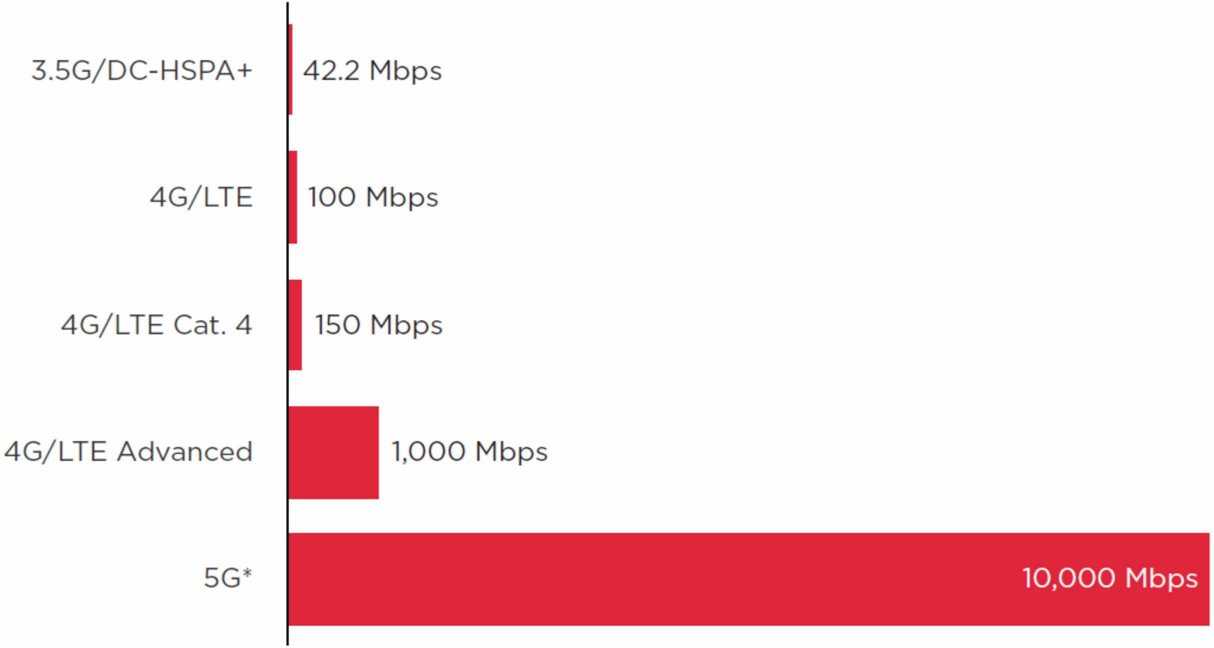

Figure 2: Maximum theoretical downlink speed by technology generation, Mbps
(*10 Gbps is the minimum theoretical upper limit speed specified for 5G)
Source: GSMA Intelligence

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Fixed

- VDSL, G.fast
- Docsis 3.1
- FTTH

- End to unbundling, VULA
- EC: open-access fiber requires no access regulation

Traffic growth accelerating

KPN's Interactive and OTT services driving exponential traffic growth

CUSTOMER BEHAVIOR CHANGING

Non-linear video traffic growing rapidly driven by unique KPN and OTT services

KPN Interactive services

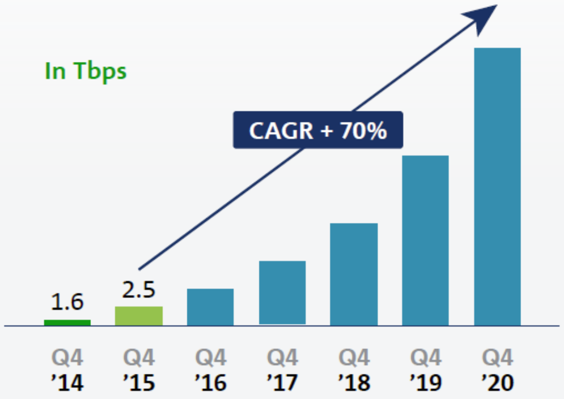
- KPN Play
- TV Everywhere
- Start-over TV
- Live TV Pausing

OTT services

NETFLIX · HBO · YouTube

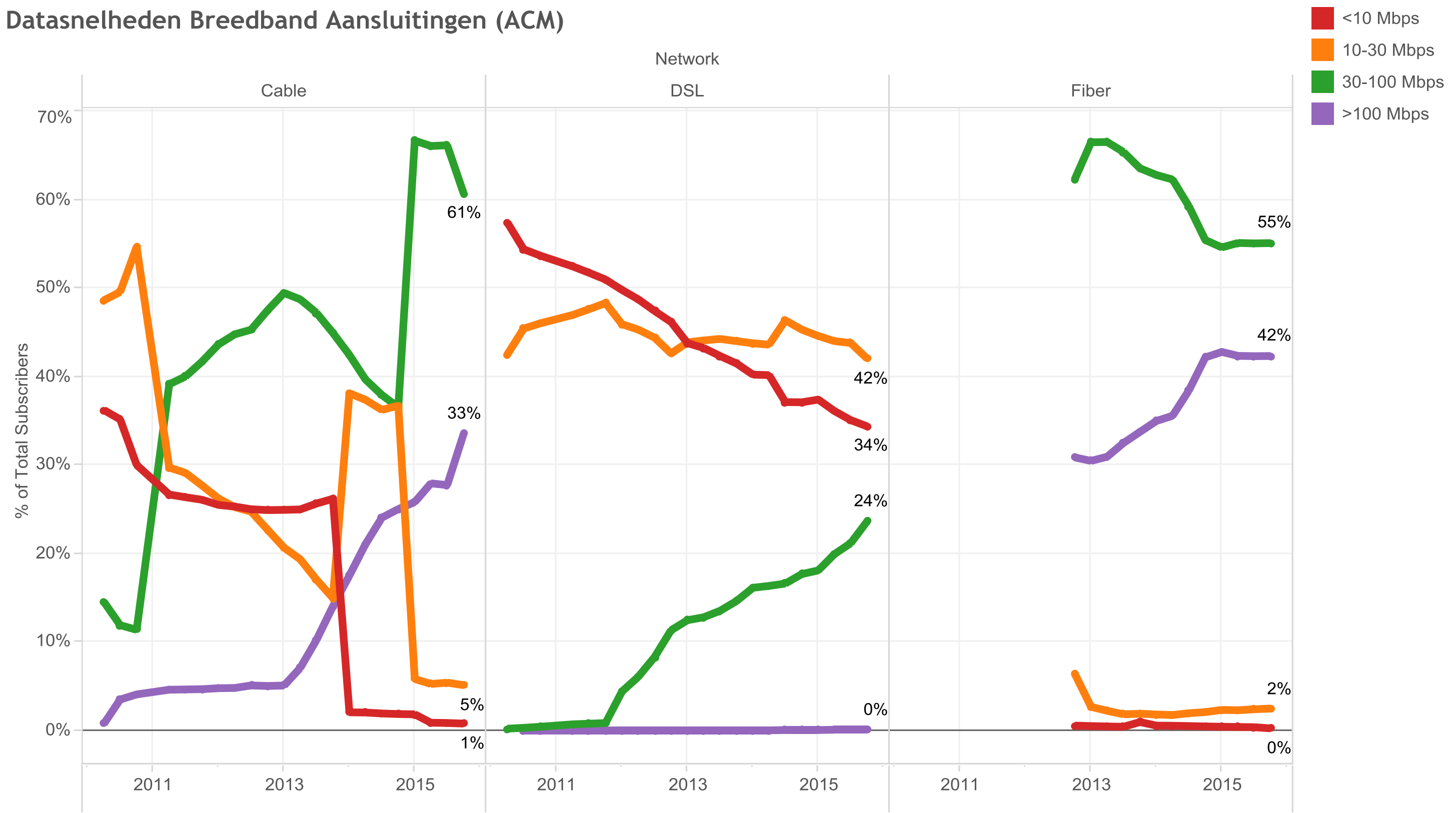
DATA USAGE ACCELARATING

Total data traffic forecast[1] (KPN fixed & mobile network)



1 Management estimate

Fixed-line download speeds rise



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WiFi

- Homespots
- Hotspots
  - Street cabinets
  - Muniwifi
  - In-flight
- Ziggo
  - WiFi-first MVNO
  - Roaming
- SURFnet
  - WiFi-as-a-Service

Time-on-WiFi

70%

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IoT

- **KPN**
  - LoRa
- **Tele2**
  - LoRa
  - IBM Watson for IoT
  - etc.
- **Vodafone, T-Mobile**
  - NB-IoT

- **Smart home**
- **Smart car**
- **Smart city**

Singapore

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New York

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Utrecht

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Water, bread and … being connected