



GSMA BARG

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# LTE in the multi-network mobility evolution

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# Agenda

Why LTE is happening ?

Multi-Network Mobility Evolution

LTE Roaming Challenges

About Starhome

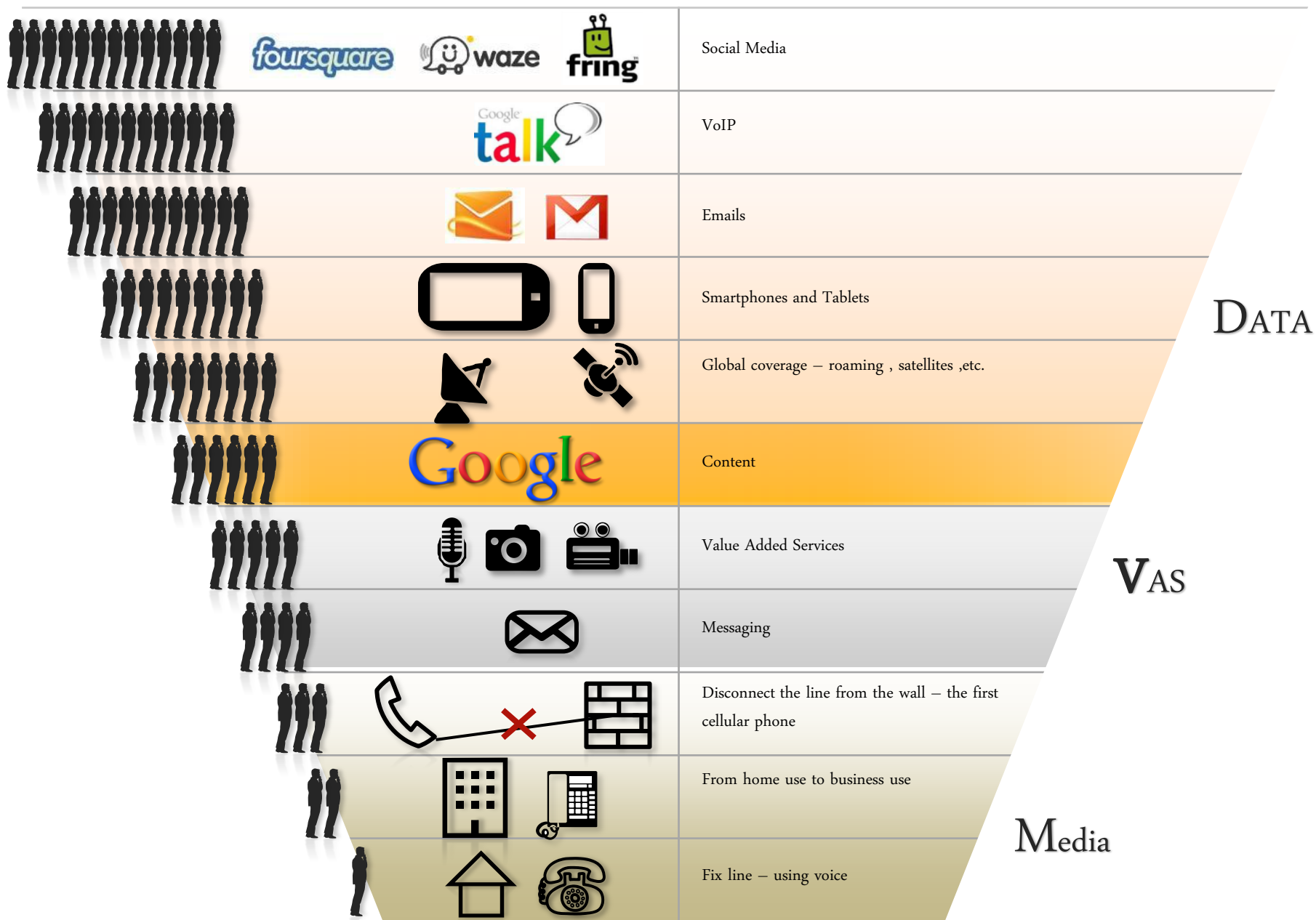
# LTE is another step of “THE NETWORK” evolution

A spiral evolution of

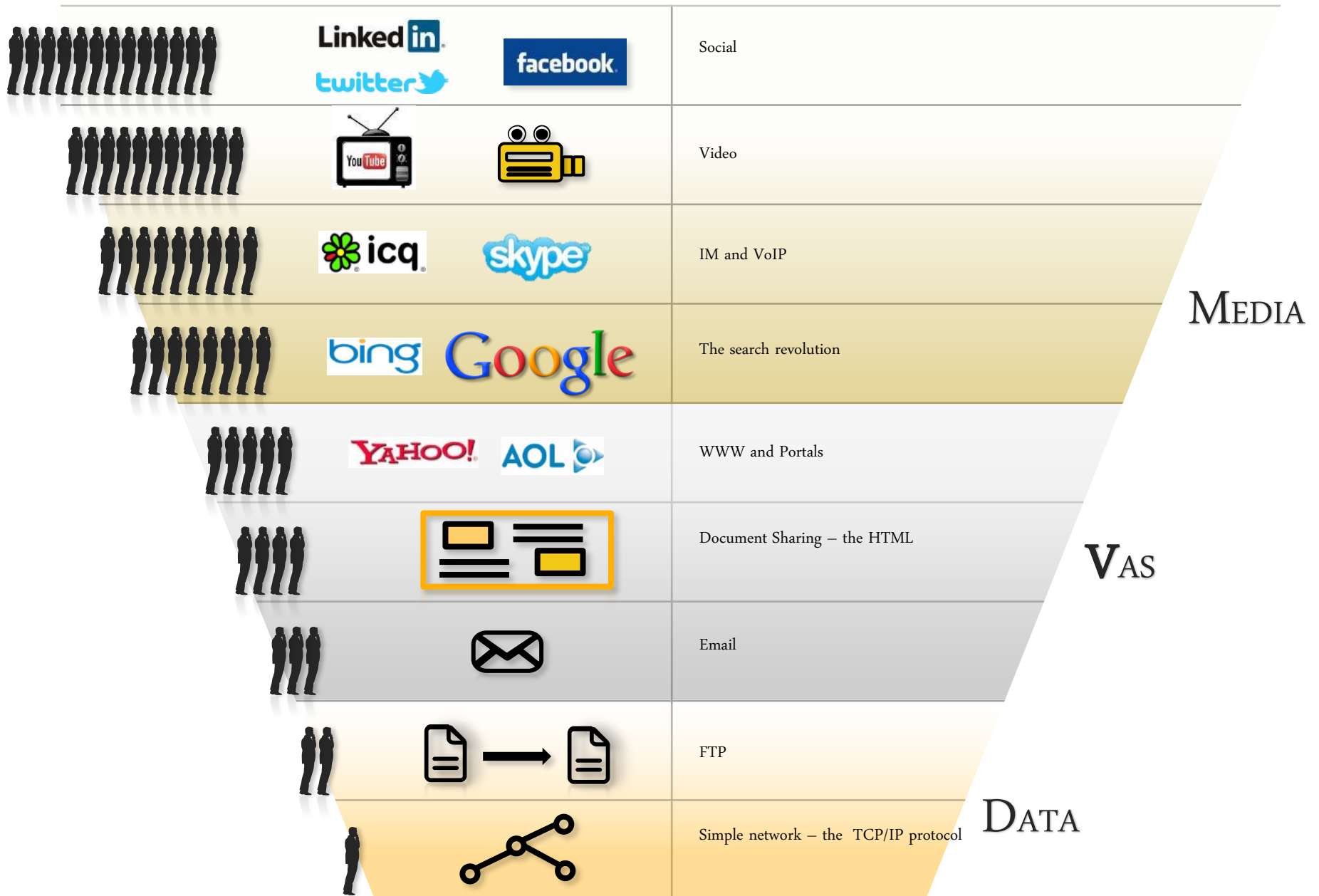
- Technology – bandwidth, speed, media type etc.,
- Use cases – that create more demand
- More users and usage



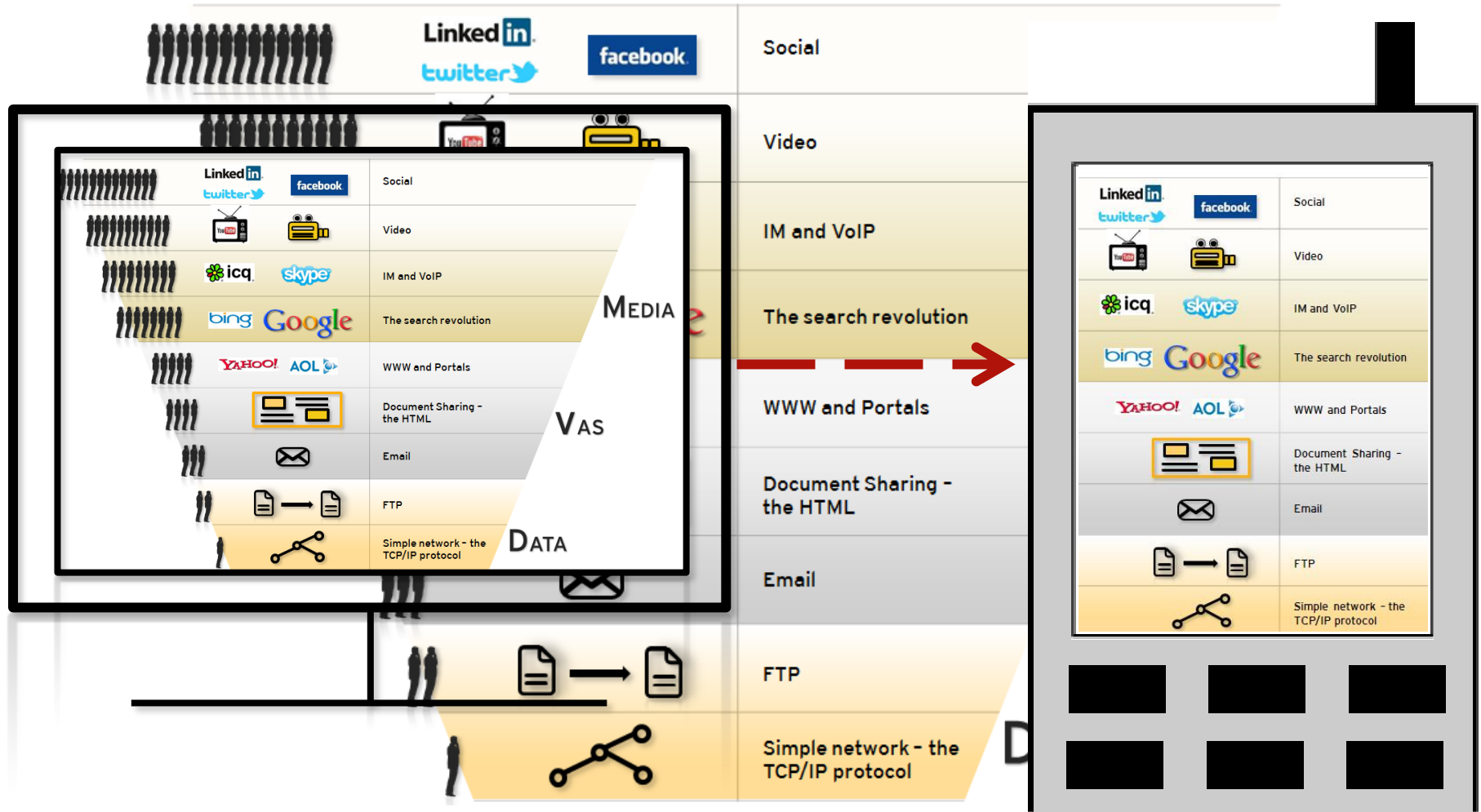
# The “Telephony Network” Evolution



# The Internet Evolution



# The Internet Transition



# The Internet@Mobile era

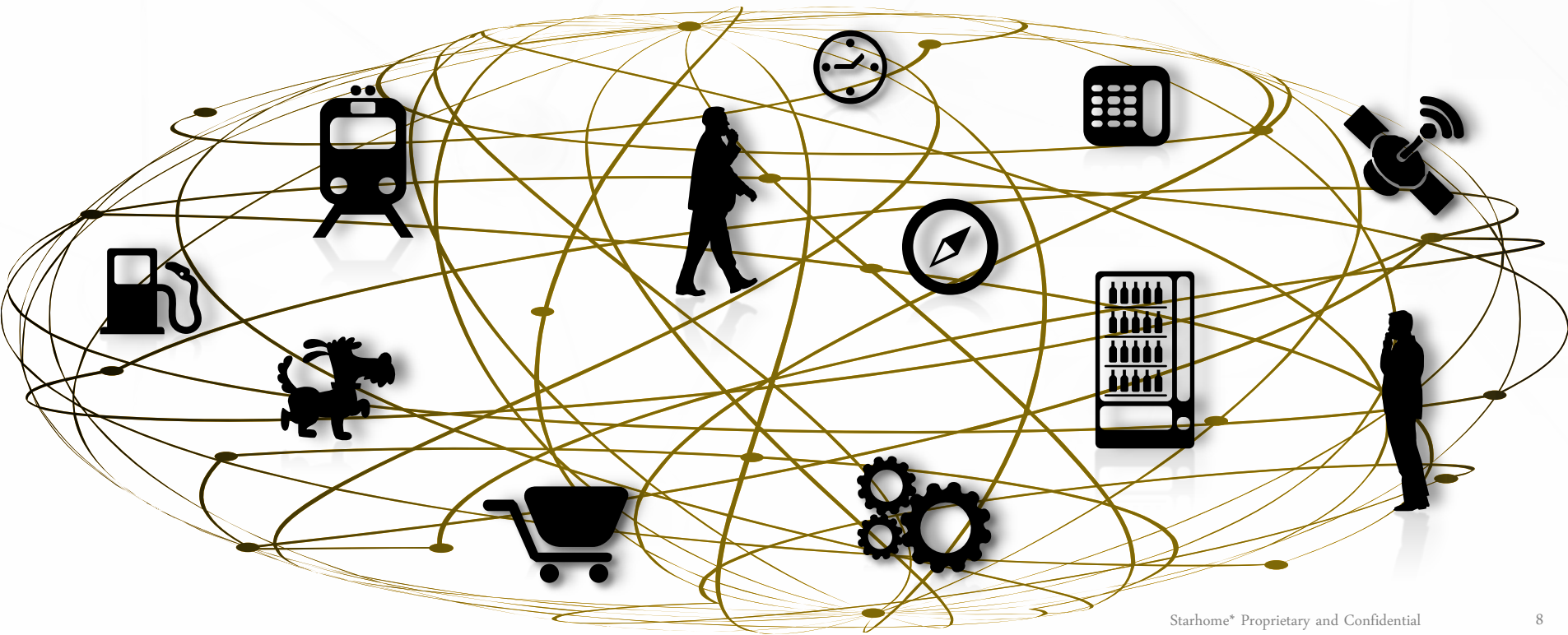
- The 2 industries
- User experience
- Internet traffic





# The future of "The Network"

Everyone and everything will be always connected  
to the Internet





## The multi-network mobility evolution

carrying your GSM phone to another network was called

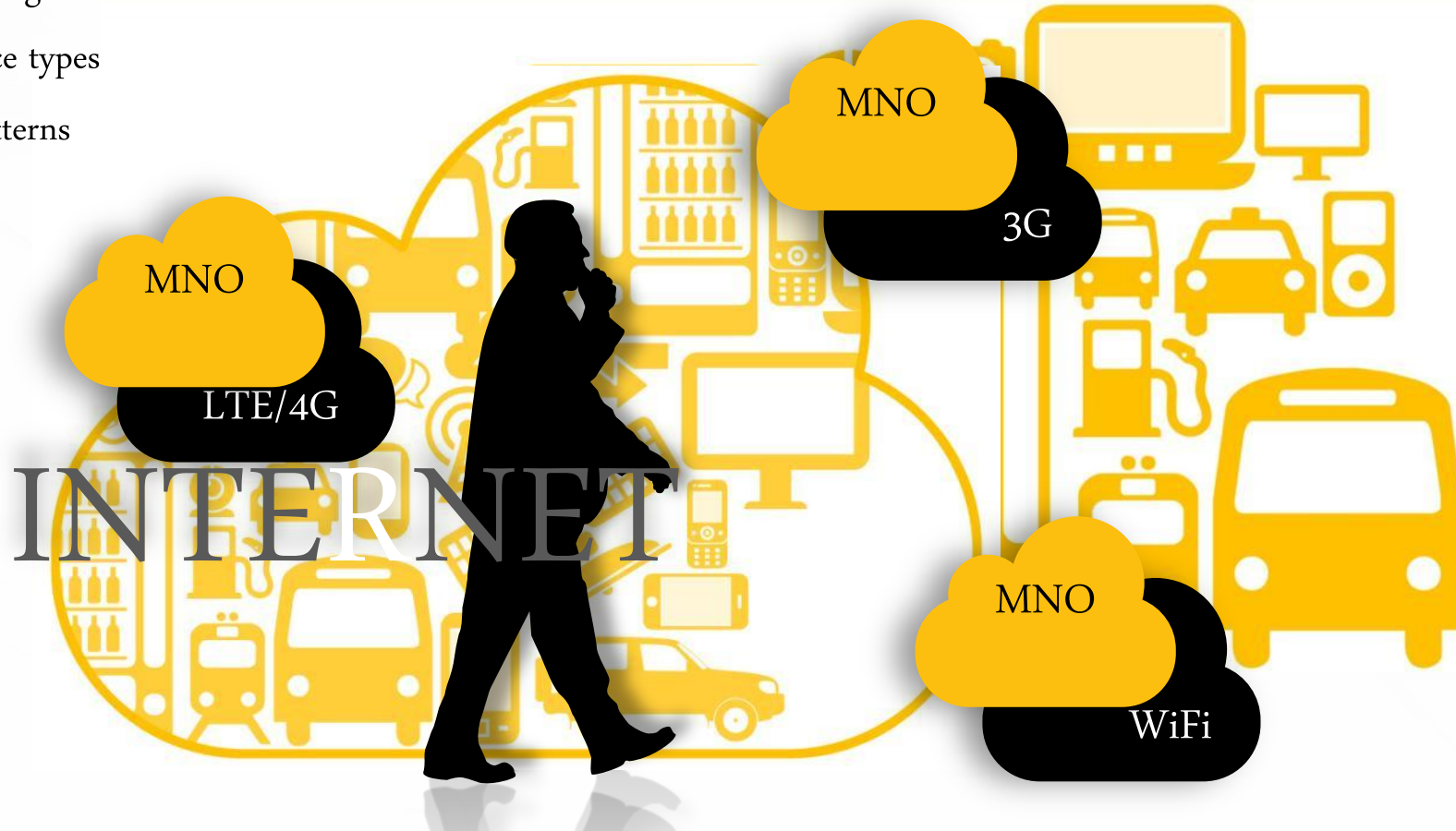
# ROAMING



# Today's Network – M2M, Hybrid, Multi-Network Mobility

All users and all devices are always connected

- Hybrid technologies
- Different device types
- New usage patterns



M2M devices are expected to deploy in much larger numbers than handsets  
MNO's are geared to play a significant role in the new world  
Data traffic overtakes voice traffic

# Why LTE?

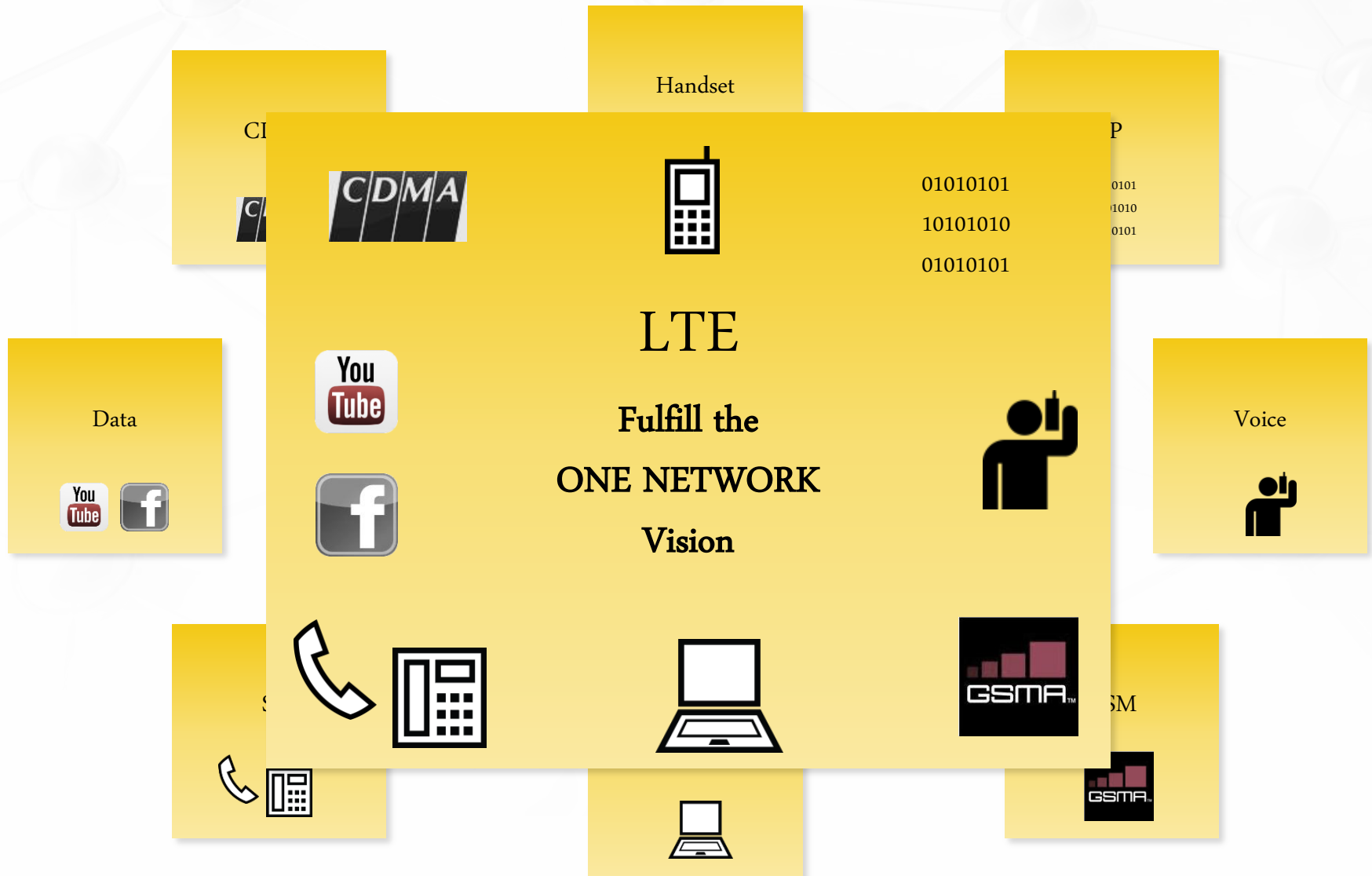
Improves network  
capacity

Lower costs

New Use Cases

Better user experience

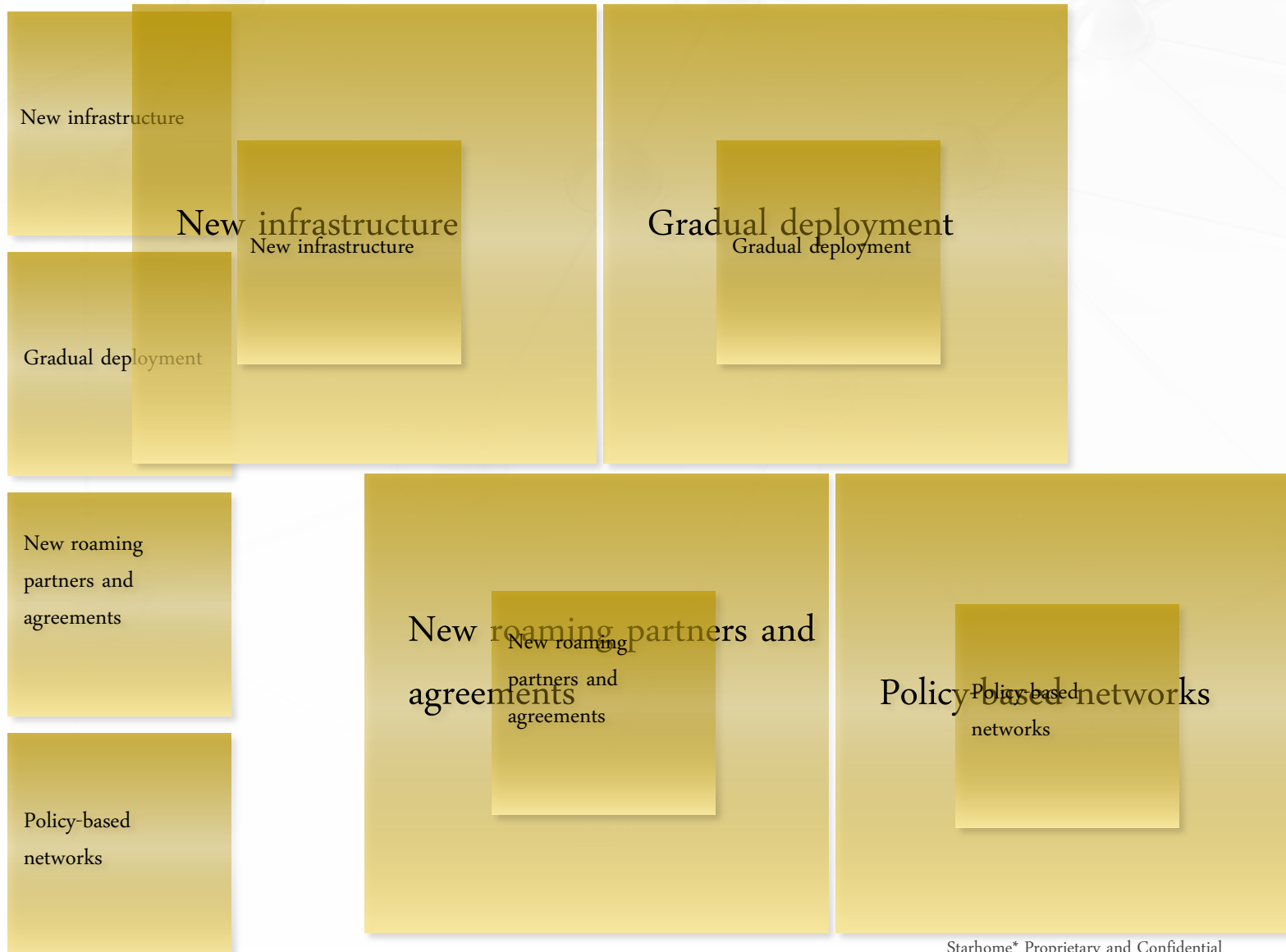
# What is the Promise of LTE?



The background of the slide features a network diagram. It consists of numerous metallic, spherical nodes connected by thin, light-gray lines. The nodes are arranged in a non-uniform, interconnected pattern across the entire frame. A horizontal band of solid orange color runs across the middle of the image, serving as a backdrop for the title text.

## LTE Roaming Challenges

# LTE Characteristics



# LTE Characteristics

## New infrastructure

- Existing systems must support IP protocols
- Integration with new core network components
- Voice over IP (phase 2)

## Gradual deployment

- Interworking of new and legacy components within HPMN
- HPMN/VPMN networks may be in different modes

## New roaming partners and agreements

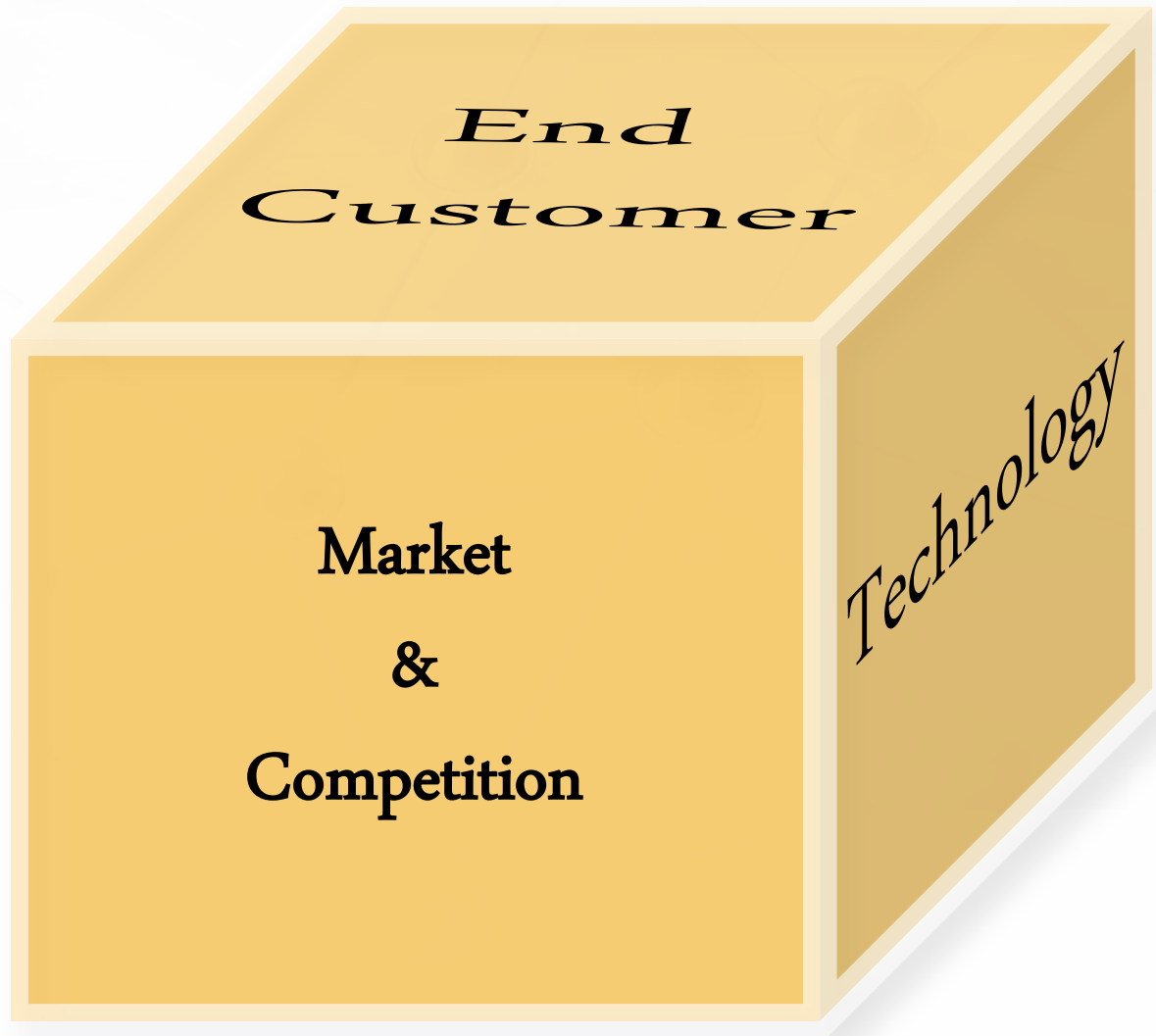
- Need to sign and test LTE roaming agreements
- Newcomers – CDMA is merging with GSM

## Policy-based networks

- Requires integration of network with BSS/OSS systems such as CRM, Billing, ERP

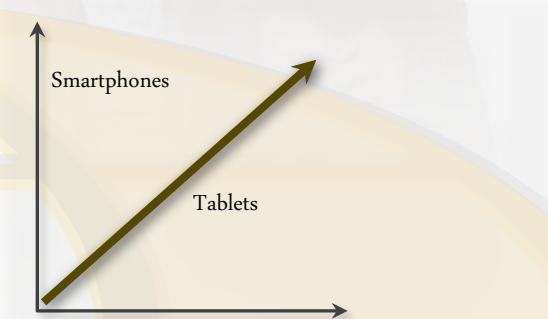
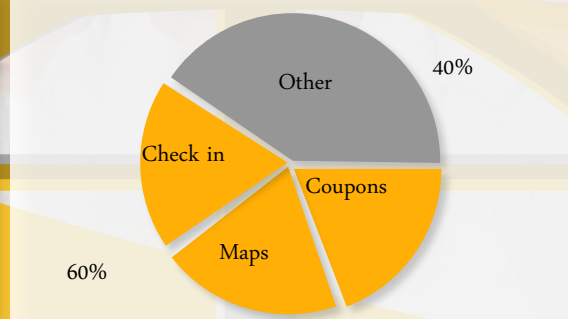
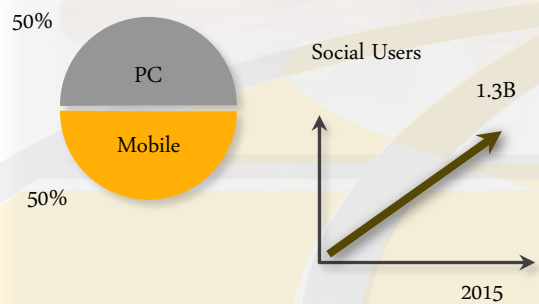


# The Change and the Challenge



**End**

**Customer**



# But... Roaming Revenue not Growing as Expected

**Bill shock**

**Misinformation**

**Data roaming not allowed**

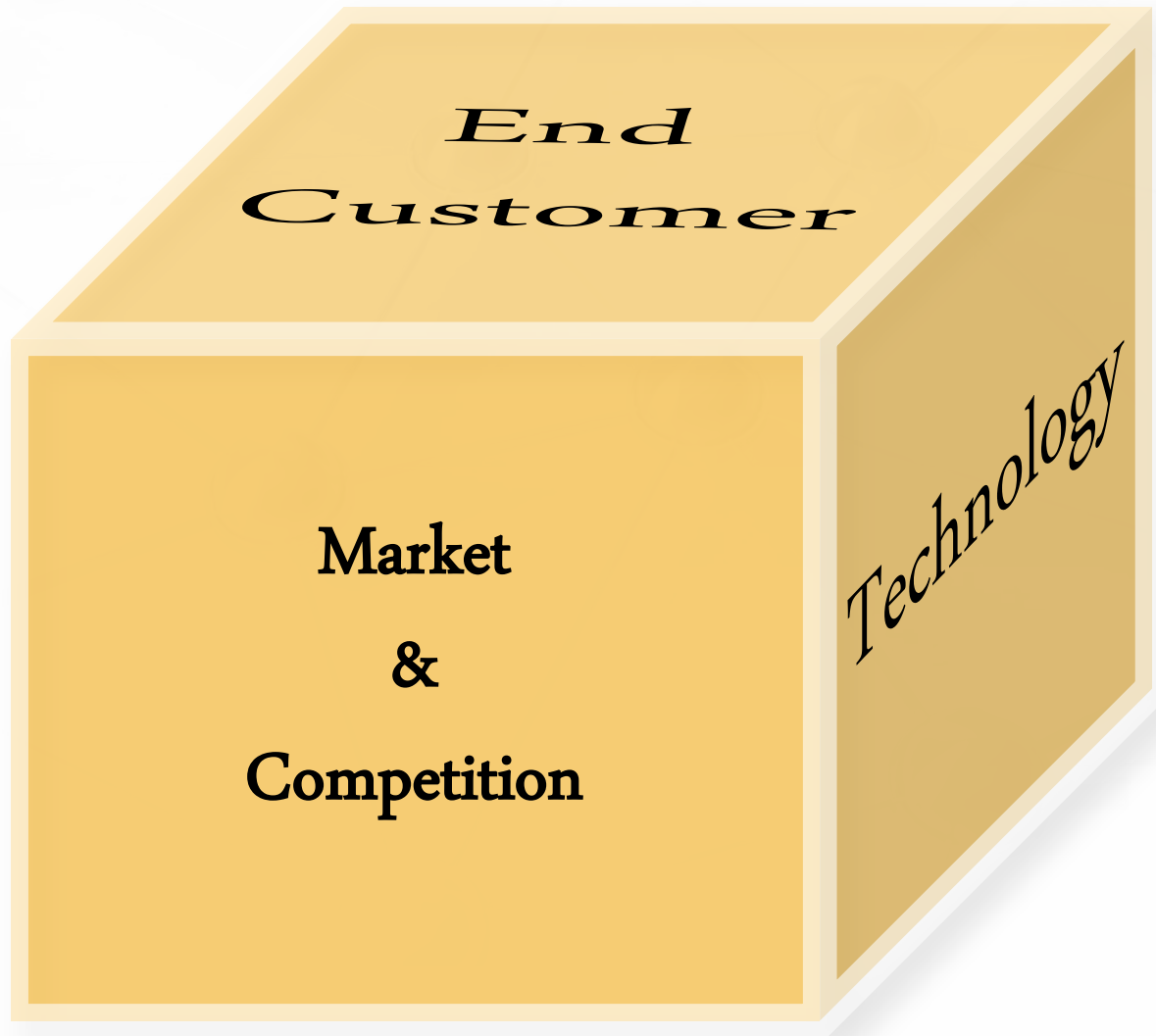
**Over-the-top Competition**

- alternatives (WiFi)

**One discount for all**



# The Dimensions of Change



# **Market & Competition**



# The Market - LTE Deployments Worldwide

Red: committed to LTE

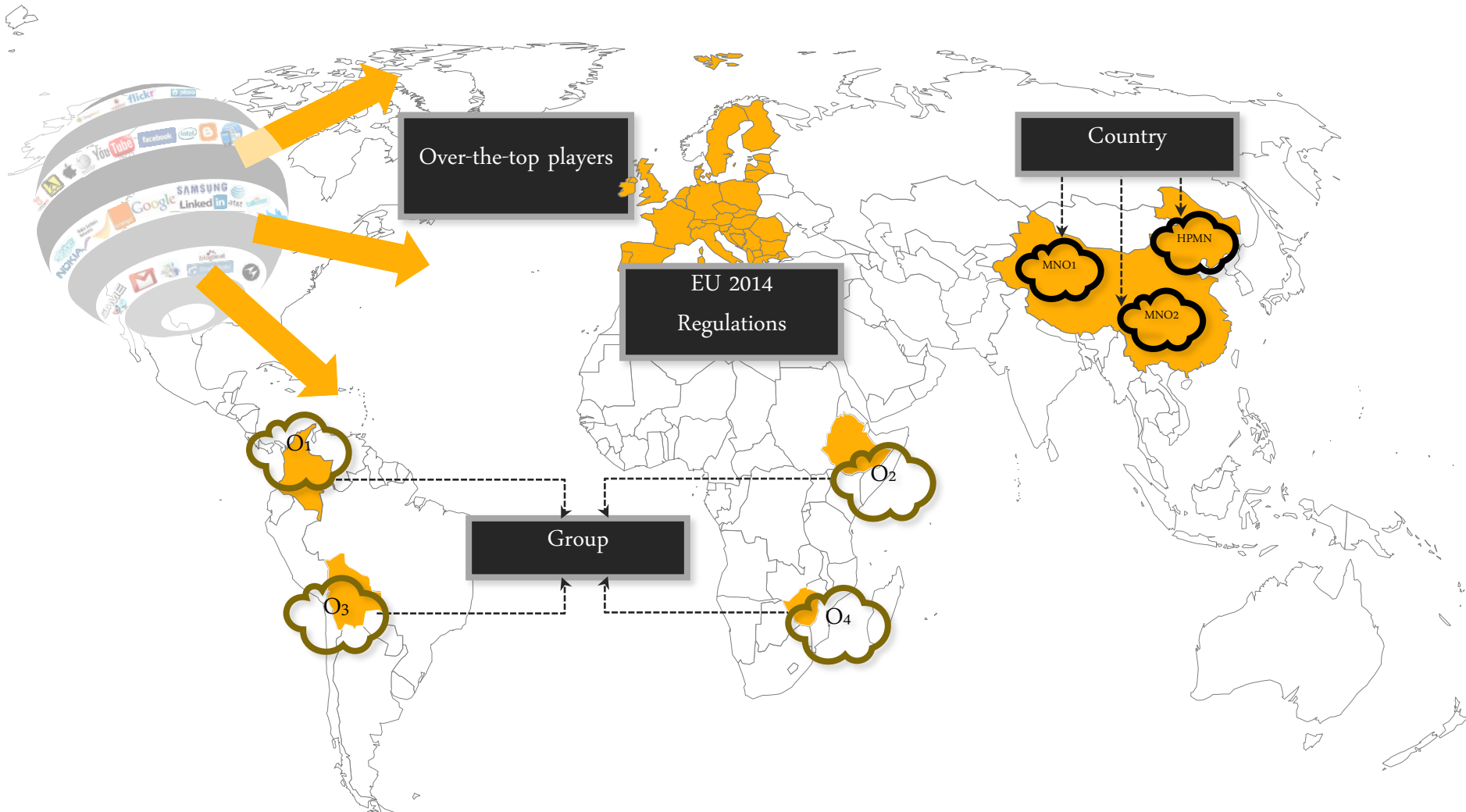
Blue: actual LTE  
deployment



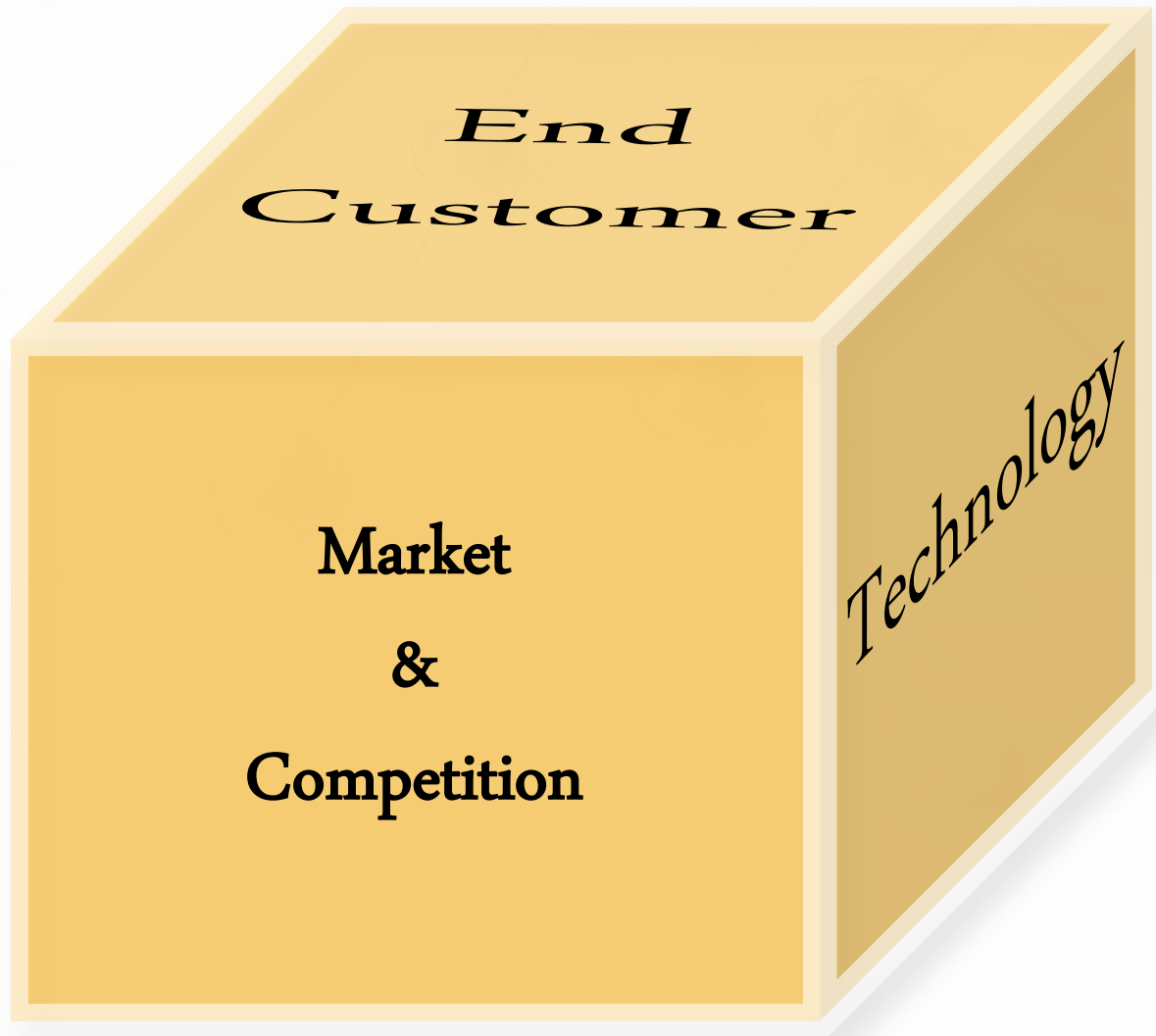


# Recognizing the Global Market Dynamics

## Market



# The Dimensions of Change





# Technology

# The Technology

## There's No Escape - Talk with the Engineers...

- New network and functional elements
  - MME, SGW, PGW, PCRF, ...
- New interfaces
  - S6a, S8, S9, S13, S13, ...
  - S6a/S6d in LTE is the equivalent of MAP-based Gr and D in Pre-Rel. 8
  - S13/S13' in LTE is the equivalent of MAP-based Gf



# Technology Challenges in LTE

- Complex technology
  - 130+ 3GPP specifications
  - 35 specs for devices, 56 specs for eNodeB, 41 specs for EPC
- Interoperability
  - 15 network dialects with which to interoperate
- Voice and SMS
  - Lack of voice support in early LTE networks
- Frequency/spectrum fragmentation

# The Frequency Challenge

## First Wave of FDD-LTE Commercial Deployments

								FDD								
	700	700	700	700	800	900	1500	1600	1700	1800	1900	1900 G	AWS	2100	2600	3500
	12	13	14	17	5-6,18-20,26-27	8	9,11,21	24	9	3	2	25	4,10	1	7	22
Australia										Telstra, Optus, VOD						
Brazil															Vivo, Oi, TIM, Claro	
Canada				Bell Mob.									Bell M. Telus, Rogers			
China																
Germany					DT, O2, VOD					DT					DT	
Denmark						Hi3G				Telia, Hi3G					Hi3G	
Finland										TeliaSonera					TeliaSon	
H.K.										CSL, PCCW, 3 HK, VOD, Smartone					China Mob	
Indonesia										Indosat						
Japan							KDDI		KDDI	eMobile				NTT		
Norway															TeleNor Netcom	
Philippines										Smart						
Poland										Aero2						
Portugal										Optimus						
Russia										Tele2						
S. Arabia										Zain						
Singapore										M1, StarHub					M1, StarHub	
S. Korea					SKT, KT, LGU+	KT				SKT, KT				LG U+		
Sweden						Tele2, TeleNor				Tele2, TeleNor					Tele2, TeleNor	
										Everything Everywhere						
USA	C-Spire	VZW LRA	Public Safety	ATT	US Cellular BC 26			Light <sup>2</sup>			Metro	Sprint	Metro Leap			

# LTE : A Policy-based Network

- Policy is built into the LTE network architecture (PCRF)
  - Enables control, optimization and revenue opportunities
- A policy-based network
  - Defines bandwidth and charging rules
  - Conducts customer session under policies
  - Presents opportunities to offer packages combining content, context, bandwidth and rating plan



Requires complex integration between business applications and  
core networks



## So... What's Next?

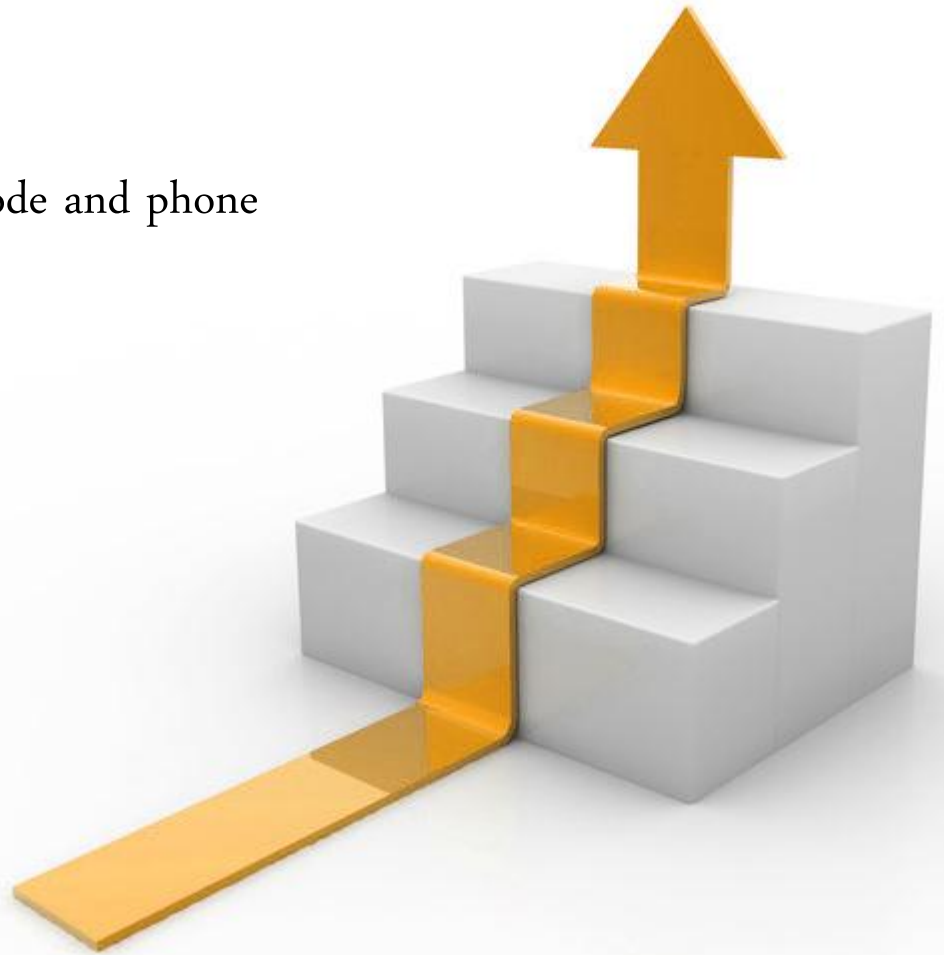


## Action Items for the Roaming Department

1. Upgrade traditional roaming and IT systems to support new LTE infrastructure
2. Promote LTE for roamers in a smart way
3. Be ready to take advantage of policies - to monetize and optimize limited network resources
4. Plan for VoLTE
5. Consider Local Break Out
6. Implement Business Analytics to measure results

## Upgrades Traditional Roaming Systems to Support LTE

- Outbound steering  
(*example next slide*)
- Call correction system such as short code and phone book dialing in IMS



# Steering in the LTE World (example)

- Supports LTE wholesale agreements
  - Apply policy and charging as stated in the agreement
- Handles multiple bands
  - Steering based on device and network capabilities as well as availability
- Steering based on LTE coverage availability
  - Registration with a non-preferred with limited resources



## Promote LTE for Roamers in a Smart Way

- Sends promotions for locations where LTE is available
  - Targeted campaigns for LTE subscribers
  - Subscribers moving between islands of coverage
  - Local and roaming scenarios
- Use media according to network and device capabilities
  - SMS
  - Data streaming



# Get Ready to take Advantage of Policies (PCRF)

- Gives priority to premium and heavy roamers
- Minimizes gap between actual and preferred per subscribers
- Agreements with
  - Third-party content providers
  - M2M providers
- Enables third-parties to set policies for their customers
- Enables “1-800” for specific application
  - Reverse billing

# Get Ready for Local Break Out

- LTE is well prepared for Local Breakout (LBO)
  - Mandatory for VoLTE
  - Improving quality by enabling local access to the Internet
- LTE visited network may provide LBO for LTE devices:
  - Even if LTE is not supported in home network
    - Requires LTE-to-3G signaling conversion
  - Special interest for US/Canada LTE-deployed networks
    - As many new global devices already support LTE (iPhone 5)



# Get Ready for VoLTE & Local Number Support

- In VoLTE Roaming (not like today)
  - Numbers dialed by inbound roamers are not processed on VPMN side
  - Numbers are transferred as is to home network
- Home network should be able to analyze dialed numbers to determine:
  - If it's an international or local number
  - Complete call by routing to appropriate destination
- Each LTE network supporting VoLTE Roaming will need to deploy this functionality

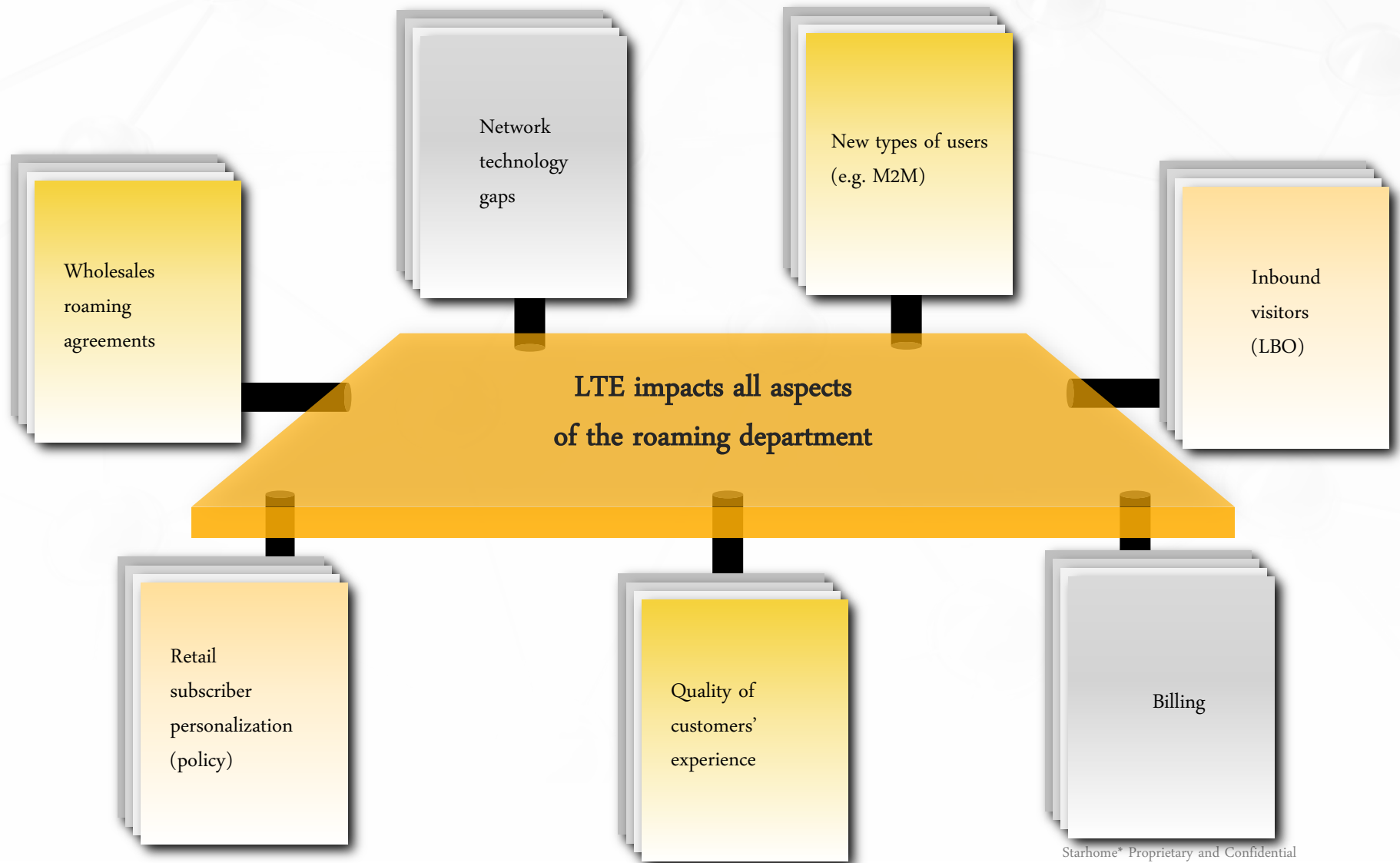
## Measure Success –

Use data available by the technology

- Samples of LTE Roaming KPIs
  - Diameter-based LU (S6a) success rate
  - Diameter-based LU (S6a) delay
  - No. of roamers per tracking area
  - Breakdown of handsets
  - Actual vs. policy bandwidth per location
  - Actual vs. policy bandwidth per service
  - Service usage breakdown



A lot of issues to handle...





**Starhome** enables mobile operators to maximize profitability in a multi-network environment



## 230 Customers Worldwide





**1000+**

**Services  
Monitored &  
Maintained**

**1**

**Unique Global IP Network**

**24/7**

**2 Global Service  
Operation Centers**

**13<sub>years</sub>**

**field -proven experience in  
telecom, IT, & the user  
experience**

**3**

**Implementation modes  
(CPE, Cloud &  
managed service)**

**15,000+**

**Weekly global roaming  
data Updates**

# The Industry's First LTE SoR

## Starhome Launches its LTE Roaming Solution in Tier 1 Operator's Network in North America

*The industry's first successful Steering of Roaming and Mobile Campaign systems to support LTE technology*

**ZURICH, Switzerland; 12 February 2013** - Starhome®, the leading provider of solutions to simplify multi-network mobility, announced today that it has successfully implemented its LTE Steering of Roaming (SoR) and Campaign Management solutions at one of North America's largest mobile operators.

The Starhome® LTE solution provides upgrades and new capabilities for existing Starhome customers to optimize service delivery and generate new revenues in an LTE environment. In today's fast changing networks, upgrading roaming to LTE is an essential factor in optimizing network performance during handover between LTE and legacy networks. The subscriber experience is also preserved since LTE-compliant solutions promote the best possible user experience by enabling subscribers to seamlessly roam in hybrid networks.

The North American operator recently upgraded its current Steering of Roaming (SoR) with the Starhome® NG-IPN-4G™ (Next Generation Intelligent Preferred Network) solution. NG-IPN-4G supports enhanced policy-based steering of roaming as well as inter-standard roaming agreements between operators in an LTE environment. The solution incorporates an enhanced Policy Control and Charging (PCC) function. The deployment of NG-IPN-4G will effectively steer their outbound roamers to preferred roaming partners, based on their devices, network capabilities and required services. The solution is also instrumental in ensuring roaming traffic and revenues are maintained and wholesale commitments are upheld.

The customer's existing Campaign Management solution was also upgraded to support LTE, which effectively enabled the delivery of the first roaming campaign message in a multi-network environment (LTE and GSM).

#### IMEI ANALYSIS

IMEI number: 359584040001360  
IMEI checksum: Check digit 0 is INCORRECT – FAULT  
Type Allocation Code (TAC): 35958404  
Serial number: 000136  
Check digit: 0  
Issuer: BABT (British Approvals Board of  
Telecommunications)

#### DEVICE INFO

Brand: SAMSUNG  
Model: GT-I9210  
Manufacturer: SAMSUNG KOREA  
Device type: PHONE  
Additional info: GALAXY S II LTE

#### DEVICE SPECS

Display type: SUPER AMOLED PLUS CAPACITIVE TOUCHSCREEN,  
16M COLORS  
Display size: 4.0 X 8.0 PIXELS, 4.0 INCHES, 207 PPI PIXEL  
DISPLAY\MULTITOUCH: YES  
Memory card slot: MICROSD, UP TO 32GB, 8 GB INCLUDED  
Internal memory: 16GB, 1 GB RAM  
GPRS: YES  
EDGE: YES  
WLAN: WI-FI 802.11 A/B/G/N, DLNA, WI-FI DIRECT, WI-FI  
HOTSPOT  
Bluetooth: YES V3.0+HS  
DATA\NFC: OPT. NFC  
Camera: 8 MP, 3264X2448 PIXELS, AUTOFOCUS, LED FLASH  
Operating system: ANDROID OS, V2.3 (GINGERBREAD)  
Browser: HTML, ADOBE FLASH  
GPS: YES, WITH A-GPS SUPPORT

#### DEVICE IMAGES



SAMSUNG GT-I9210 SAMSUNG GT-I9210T



# Summary

- Roaming LTE is happening now
- Roaming departments need to catch up
- Transition will take time - be prepared for hybrid environment
- Start now to be ready



A background image featuring a network diagram with silver spherical nodes connected by thin lines, set against a light gray background.

THANK YOU

**Starhome Roaming for LTE**

GSMA LA Barg – Aruba – Sept '14