4th Annual i3forum Conference

The Future is All IP

May 16, 2013
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Isabelle Turcotte

i3forum Communications Workstream Chairman

Tata Communications

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Philippe Millet

i3forum Chairman

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i3forum 4th Annual Conference

The Future is all IP

i3forum
4th Annual
Conference

Chicago, May 16th 2013

Philippe Millet – Chairman, i3forum

A brief history of the i3forum – going strong!

- Founded in 2007, now 48 diverse carriers
- We carry 80% of the world's Int'l voice traffic, serving 2 billion people
- Mission : Making it easier for all carriers to transition to an all-IP world, focus on International Interconnections

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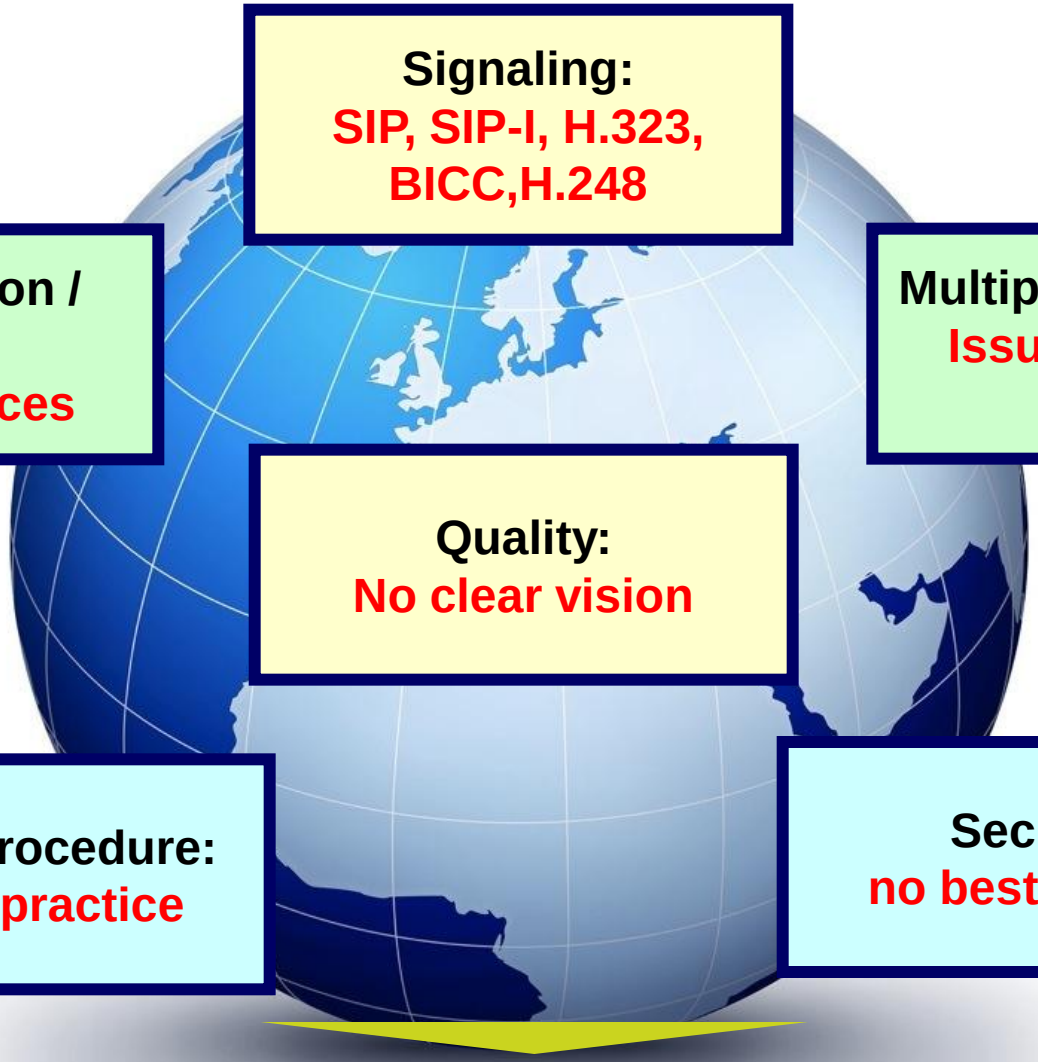
Together we are bringing about the all-IP Future !

- Multiple reasons to transition to IP - it is happening NOW!
  - Technology: TDM end-of-life, Capacity management, Vendors' roadmaps
  - Economics: Cost reduction, Agility, Green
  - Business: New retail services, Wholesale opportunities, Peer pressure
- Industry has to get to the "other side" fast to reap benefits of all-IP world
- When and how to move from a world that works to an IP New World?
  - Not "plug and play"…..
- Many questions, few answers…
  - What technology decisions should I make?
  - What should I invest in and when? Will it work with other carriers?
  - What happens to my existing business? Where are the new opportunities?
  - What about Quality? And Security?
  - Do I need to re-invent the wheel with all my partners?
- That's where **we** step in - Carriers Interconnects are key to end-to-end services
  - We need to make it happen together

A pragmatic approach

The Voice over IP world in 2007/08



Signaling:
SIP, SIP-I, H.323, BICC,H.248

IP Configuration / Coding:
Multiple choices

Multiple Voice Codec:
Issues with FoIP, ISDN…

Quality:
No clear vision

Testing Procedure:
no best practice

Security:
no best practice

Too many choices, no clear path forward, no best practice

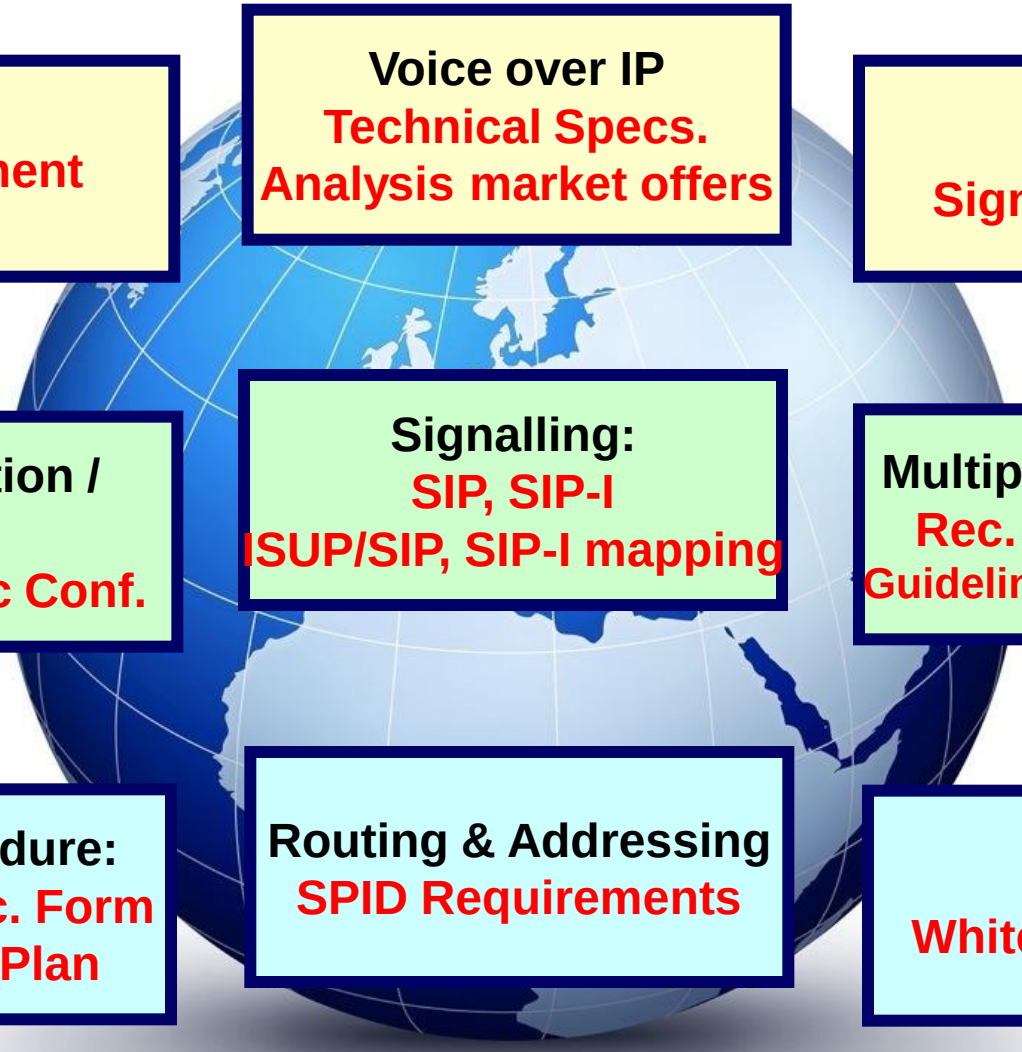
Top 5 Topics on Our Agenda

Looking into Technology, Business, Operations, Fraud …

1. Defining technical and service models for IP voice, legacy products (fax…) and other services such as Video, HDVC
2. Guaranteeing safe and reliable communications, including how to better manage anti-Fraud actions
3. Managing increased routing and addressing complexity (SPID, ENUM…)
4. Defining Quality of Service & how to measure it
5. Meeting service provider requirements within IPX and other converged frameworks (incl. work on VoLTE, IPX Transport)

… and making a difference as a catalyst for the transition to IP

The Voice over IP world in 2013



IPX
Core Document
VoIPX

Voice over IP
Technical Specs.
Analysis market offers

IMS
Signalling Profile

IP Configuration / Coding:
Private / Public Conf.

Signalling:
SIP, SIP-I
ISUP/SIP, SIP-I mapping

Multiple Voice Codec:
Rec. Voice Codecs
Guidelines for FoIP Interc.

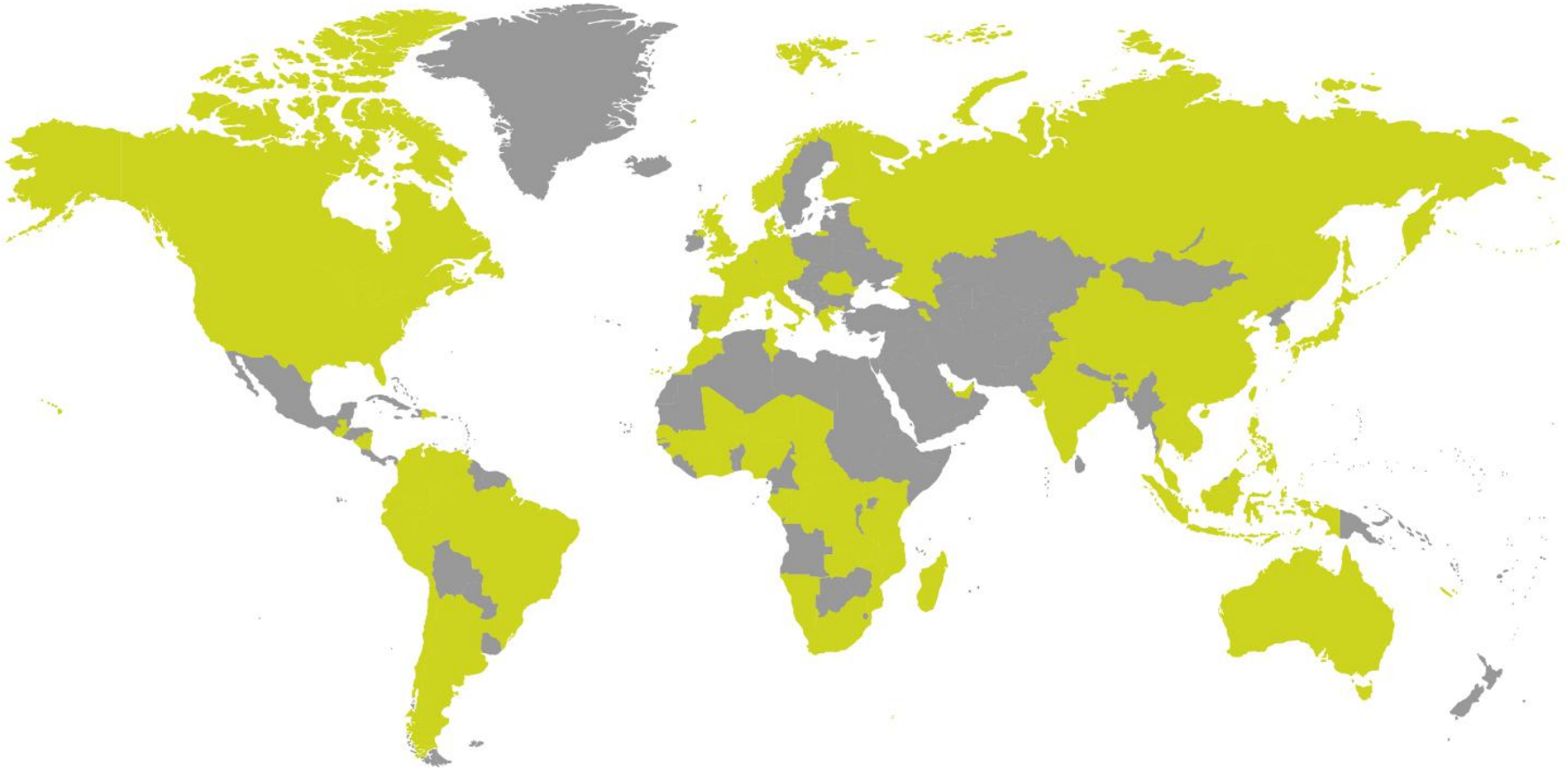
Testing Procedure:
Migration Interc. Form
Interop. Test Plan

Routing & Addressing
SPID Requirements

Security:
White Paper in 2011

Transitioning the Industry to IP

VoIPX is a reality today – available in 65+ countries



Now taking IPX adoption to the next level, together with the GSMA

This map was built from the input of the following members: Aicent, Telia Sonera, BICS, PCCW Global, Tata Communications, Voxbone, Orange, PLDT, TI Sparkle, iBasis, SFR, Deutsche Telekom, Telus, Telefonica

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Moving IPX adoption to the next level
VoIPX Pilots – A Joint Annoucement with GSMA

Aicent , BICS, Chunghwa Telecom, ETISALAT, GSMA, iBasis, Orange, International Carrier, OTEGLOBE , PCCWG, PLDT Carrier Business, Tata Communications, Telecom Italia Sparkle,Telekom Austria Group,Telenor Global Services,TeliaSonera International Carrier,Telstra Global

If you want to learn more and participate in the discussion…

capacity

The i3 Workshop Middle East 2013

The i3 Workshop Series 2013 - 2014

The discussion about the future of IP interconnections will continue next September.

Join us in Istanbul for the next instalment of the i3 Workshop Series, organised by Capacity Media in Association with the i3 Forum

i3 Workshop Eurasia - Istanbul, 9 September 2013

i3 Workshop Asia - Bangkok, 31 October 2013

i3 Workshop Middle East - Dubai, 5 March 2014

IPX – VoLTE – HD Voice – LTE Roaming – Signalling & Routing - IP Security

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Thank You !

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Visit **www.i3forum.org**

- More information on the i3forum and its publications
- Additional documents to be released during the course of the year

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Ian Pannell

Deputy CTO

GSMA

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IP Interworking for voice services – Time has come for an operator grade approach

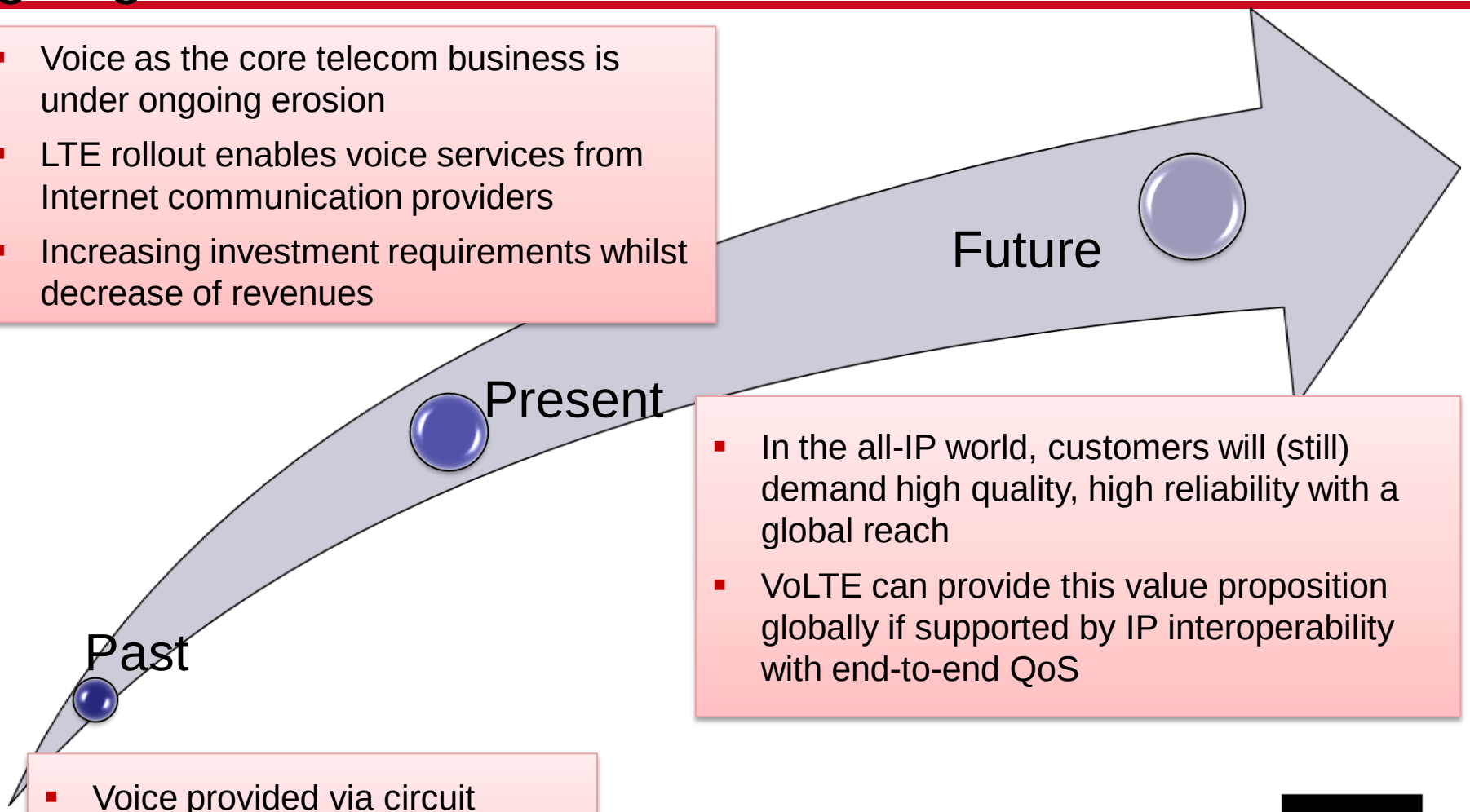
International Telecoms Week

14th May 2013, Chicago

Ian Pannell
Chief Architect, GSMA

Telecoms voice business is challenged by networks going all-IP

- Voice as the core telecom business is under ongoing erosion
- LTE rollout enables voice services from Internet communication providers
- Increasing investment requirements whilst decrease of revenues



- In the all-IP world, customers will (still) demand high quality, high reliability with a global reach
- VoLTE can provide this value proposition globally if supported by IP interoperability with end-to-end QoS

- Voice provided via circuit switched network end-to-end. Implicitly providing a quality managed service (TDM voice)

Full end-to-end IP connectivity is required to support quality voice evolution

- **This enables end-to-end quality of service across networks**
- **This maintains the quality, reliability and security value propositions of today's voice**
- **This enables interoperability of voice evolutions (VoLTE, HD voice…) from day 1**
- **This ensures we can keep up with our customers' future needs**

IPX has been developed and deployed as an interconnect solution that ensures quality, reliability and security for voice evolution

Cooperation is needed to make this the future (1/2)

- GSMA is promoting the migration of voice interconnect to IPX
- GSMA is facilitating international long distance commercial end-to-end IP voice pilots organised in 2013
  - Gain practical experience with VoIPX and IPX capabilities
  - Expand the number of countries and operators accessible via VoIPX
  - Upon successful pilot and commercial negotiations between stakeholders: migrate commercial traffic or use for new all-IP traffic

Cooperation is needed to make this the future (2/2)

- Mobile operators recognise that cooperation with i3Forum and carriers is key to the success of this initiative
  - Carriers have the IPX knowledge and capability mobile operators need
  - Carriers have experience in deploying VoIPX, mobile operators want to harness this experience to deploy VoIPX interconnect at scale, with a high level of quality and reliability
  - Carriers can help us communicate to the whole industry
- We are working together for the success of interoperable IP communications!

Thank you

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Amy Lamboley

Director of Marketing Communications,

Global Voice Solutions

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Detailed plan of the VoIPX Pilot Initiative Panel Discussion

Panelists:

Christopher Lengyel, Director of Strategic Marketing, iBasis

Mike Corso, Product Manager – VoIPLinkTM, Tata Communications

Philippe Millet, Chairman, i3forum

Ian Pannell, Deputy CTO, GSMA

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Philippe Millet

i3forum Chairman

i3 forum
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Overview of i3forum recommendations Panel Discussion

Panelists:

Alessandro Forcina, Technical Aspects Workstream Chairman,TI Sparkle

Katia Gonzalez Gutierrez, Fraud Manager and Revenue Assurance Product Manager, BICS

Mike Corso, Product Manager – VoIPLinkTM, Tata Communications

Piero Francesco Irrera, Director Wholesale Carrier Services,Vodafone

Carlos Da Silva, Director, Product Business Development, PCCW Global

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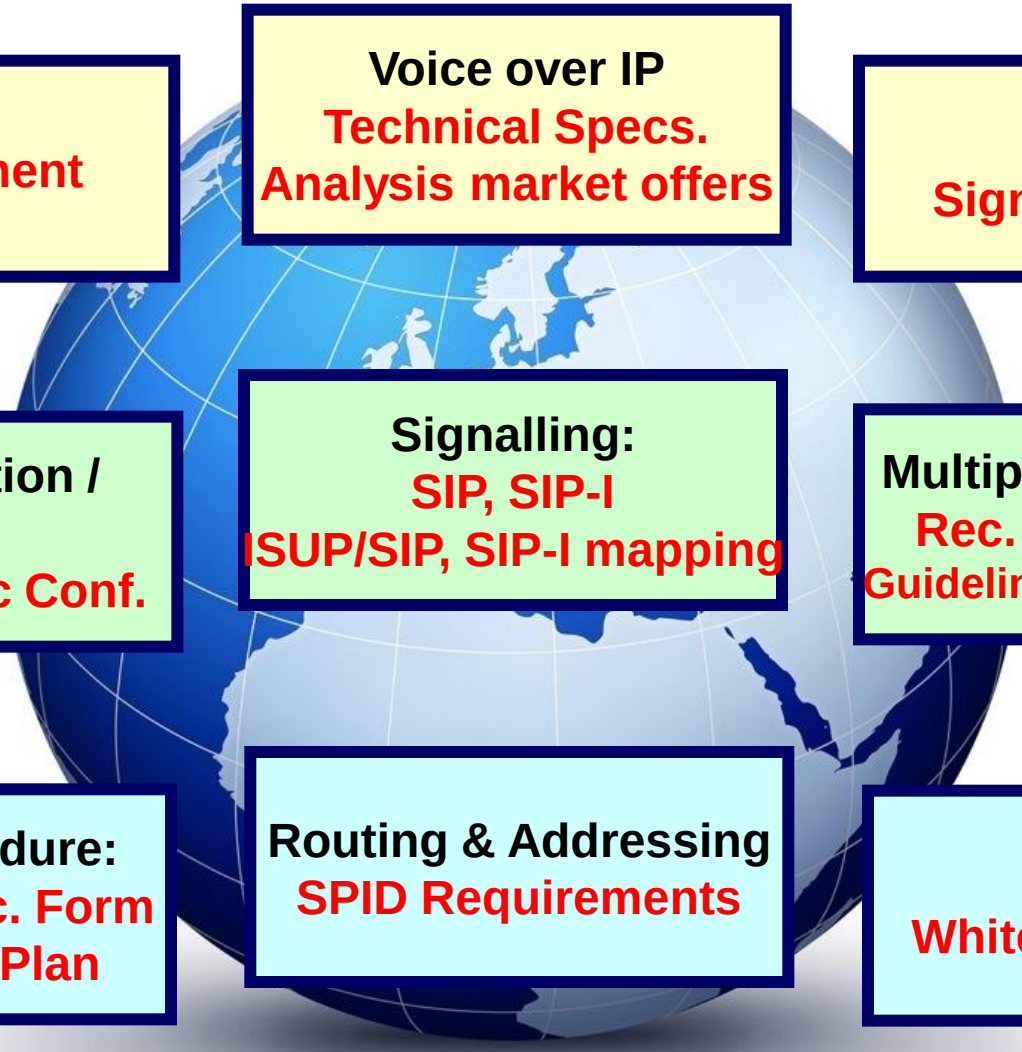
international ip interconnection

The Voice over IP world in 2013



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Transitioning the Industry to IP

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Panel Discussion

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Session on IPX
The Integrated Approach

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Alessandro Forcina

Technical Aspects Workstream Chairman

Telecom Italia Sparkle

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IPX 6 years later: achievements, remarks and opportunities

presented by

Alessandro Forcina

(i3 Forum WS "Technical Aspects" Chairman)

TELECOM ITALIA SPARKLE

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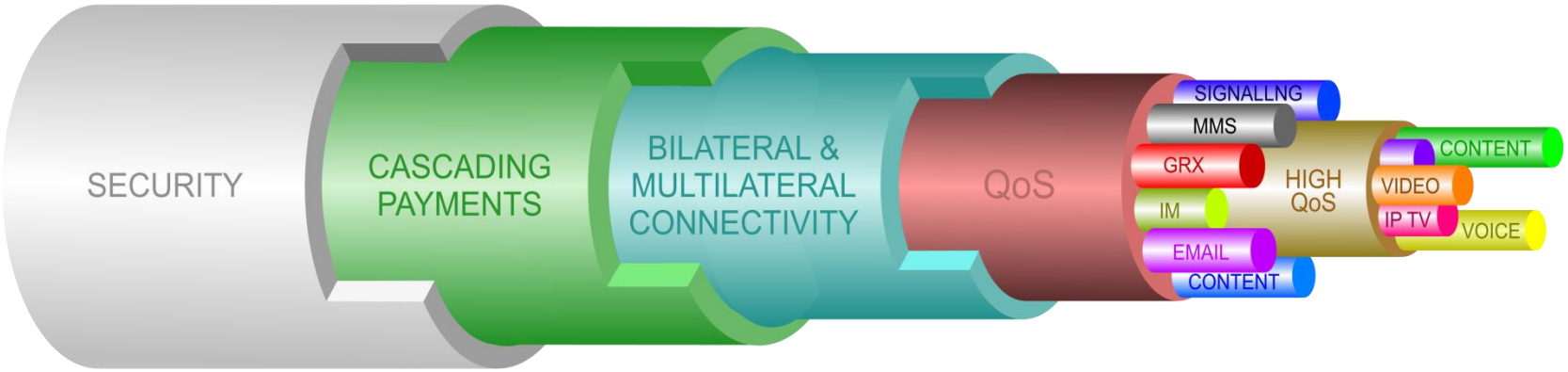
Agenda

- The GSMA Requirements
- The Industry Answer
- The i3f definition and deliverables
- Opportunities

IP Packet eXchange



Multiservice / Efficiency

- Ubiquitous Service via single Gateway
- Multilateral commercial (new) agreements
- Flexibility & scalability

Cascading payments

- Cascading of revenues from End to End
- Payment by whoever perceives the value

Quality

- Guaranteed QoS (E2E SLA, Reliability)
- Security (accountability, spam reduction)
- Separation from Public Internet

Openness

- Open to everyone
- Ubiquitous access (MNO, FNO, ISP, ASP)

Industry implication

IPX is NOT a new technology/protocol/service
It is an innovative model for existing services

IPX Specifications

Main IPX Deliverables

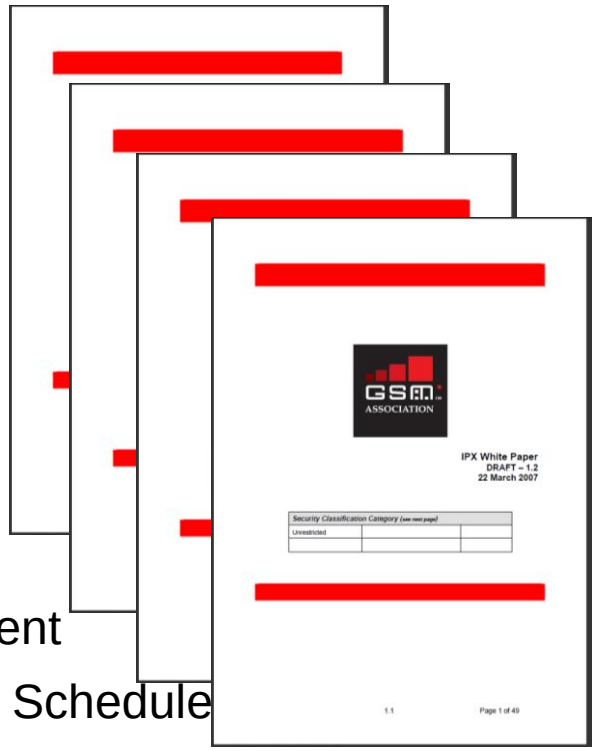
- IPX White Paper, March ***2007***

Technical docs.

- IR. 34 Inter-SP IP Backbone Guidelines
- IR. 67 on DNS Guidelines
- IR. 77 on Security Requirements
- ….

Commercial docs.

- AA.80 IP Packet eXchange Service Agreement
- AA.81 Packet Voice Interconnection Service Schedule
- AA.82, 83 SMS, MMS Service Schedule
- …...



The Industry Answer to IPX

- Lack of clarity on what IPX is → Multiple announcements proposing different models, offering different services with different capabilities.

MNOs/FNOs (i.e. Service Providers)

- Specification pushed from mobile division of major Telco Group
- Weak demand from mobile industry delaying investments for IP migration
- Weak demand for some capabilities requested from GSMA

OTTs (i.e. Service Providers)

- Theoretical interest?

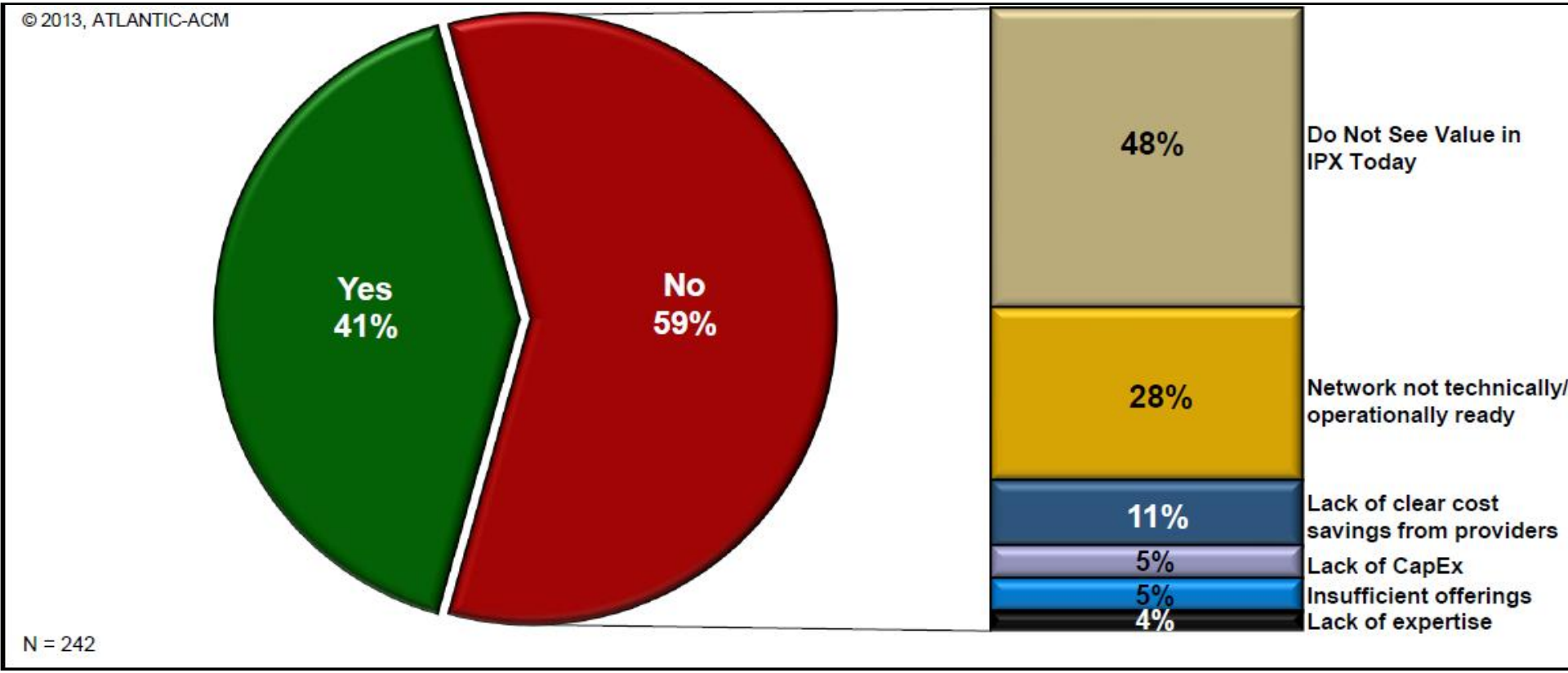
Carriers (i.e. IPX Providers)

- Many IPX offers in the market: voice, mobile data, transport
- In general, high quality and trusted services are offered
- NOT all GSMA requirements fully met (e.g. QoS end-2-end control)
- Different business models adopted

Industry implication ***IPX is one way for implementing the IP migration***

Network Readiness to IPX?

Source: ATLANTIC-ACM 2013 Global Wholesale Survey



Some Issues on IPX

How does IPX differ from other IP-based interconnection models?

- What does it mean QoS control over the IPX (Carriers') domain?
- Can we use SIP signalling for Voice over IPX?
- Can we break-out via Public Internet?

- Does IPX require an ad-hoc routing plan?
- Are the GSMA specifications for the guaranteed IPX level of support met by the market?

- Should cascading business model be applied to all services?
- Do we have to modify the existing contractual framework?
- Will LTE / VoLTE be real push for IPX adoption?
- Pricing: how to set the correct pricing?
- …..

Industry implication

IPX definition and its business framework need some answers

The i³ forum definition of IPX (1/2)

IPX refers to a class of IP interconnection models and implementation….

- Based on private IP Domain (i.e. **no use of the Public Internet**) which spans from Service Provider to Service Provider
- **Multi-service capable** (implementation ….. is a commercial matter)
- Designed and operated to support **High Quality** IP based services (**break-outs and break-ins** to/from non-IPX services are possible and **disclosed**)

- **Allows a cascading business model**
- Guarantees **service assurance** across the whole IPX Domain being (among others):
  - SLA capable (SLAs can be offered, actual implementation is a commercial matter)
  - Secure (e.g. MPLS based but other technique can be used)
- Scalable (as opposed to dedicated bilateral private IP interconnects)

Industry implication

GSMA's IPX specifications define a specific implementation of IPX

The i3 forum definition of IPX (2/2)

- An IPX platform can support both pure **transport services**, where the IPX Provider is unaware on the type of carried information, and **higher layer services** involving additional capabilities of the IPX Provider network (e.g. switched services).
- IPX implementations and offers all share the characteristics listed on the previous slide, but **differ in multiple ways, both technical and commercial**
  - Additional features/services e.g. transcoding, codec transparency…
  - Services supported (voice, signalling, data…)
  - SLAs
  - Price

VoIP vs. VoIPX Interface

	Market VoIP Private	GSMA VoIPX	i3f VoIPX
Architecture	Mono service	Multiservice environment	Multiservice environment
Physical Interconnect	VLAN over L1 (direct), L2 (Ethernet) in few cases L3 (IP VPN)	VLAN over L1 (direct), L2 (Ethernet) in few cases L3 (IP VPN)	VLAN over L1 (direct), L2 (Ethernet) in few cases L3 (IP VPN)
IP Packet Marking	based on DSCP	based on DSCP	based on DSCP
IP Addressing & Routing	IPV4 (IPV6) BGP-4	IPV4 (IPV6) BGP-4	IPV4 (IPV6) BGP-4
Class of Service Mngmt	Conversational (media) + Interactive (signalling)	Conversational (media) + Interactive (signalling)	Conversational (media) + Interactive (signalling)
Media	Main: G.711, G .729 family + others	Very large set of codecs (G.711 mandatory)	Mandatory: G.711 and G.729 family Others: optional
Signalling	SIP-I and SIP	SIP-I and IMS-SIP (and IETF SIP to be agreed?)	SIP-I and SIP
Addressing	ITU T – Recc. E.164	ITU T – Recc. E.164	ITU T – Recc. E.164

VoIP vs. VoIPX Service

	Market VoIP Private	GSMA VoIPX	i3f VoIPX
Security	SBC de facto standard + other actions carrier dependent	Border Gateway + set of recommended actions	SBC mandatory + set of recommended actions
Routing (at the service layer)	No specific rule	Max 2 IPX Providers (3 IPX P as exceptional case with no quality impairment)	Max 2 IPX Providers (3 IPX P are possible with no quality impairment)
QoS monitoring	In most cases for Service parameters only	For Transport parameters and Service parameters	For Transport parameters and Service parameters
QoS reporting	In most cases for Service parameters only	For Transport parameters and Service parameters	For Transport parameters and Service parameters
Business Model	Sending Party Pays	Sending Party Pays	Sending Party Pays
Customer Care	Depends on Carrier policy	Depends on Carrier policy (in general high level of cust. care)	Depends on Carrier policy (in general high level of cust. care)

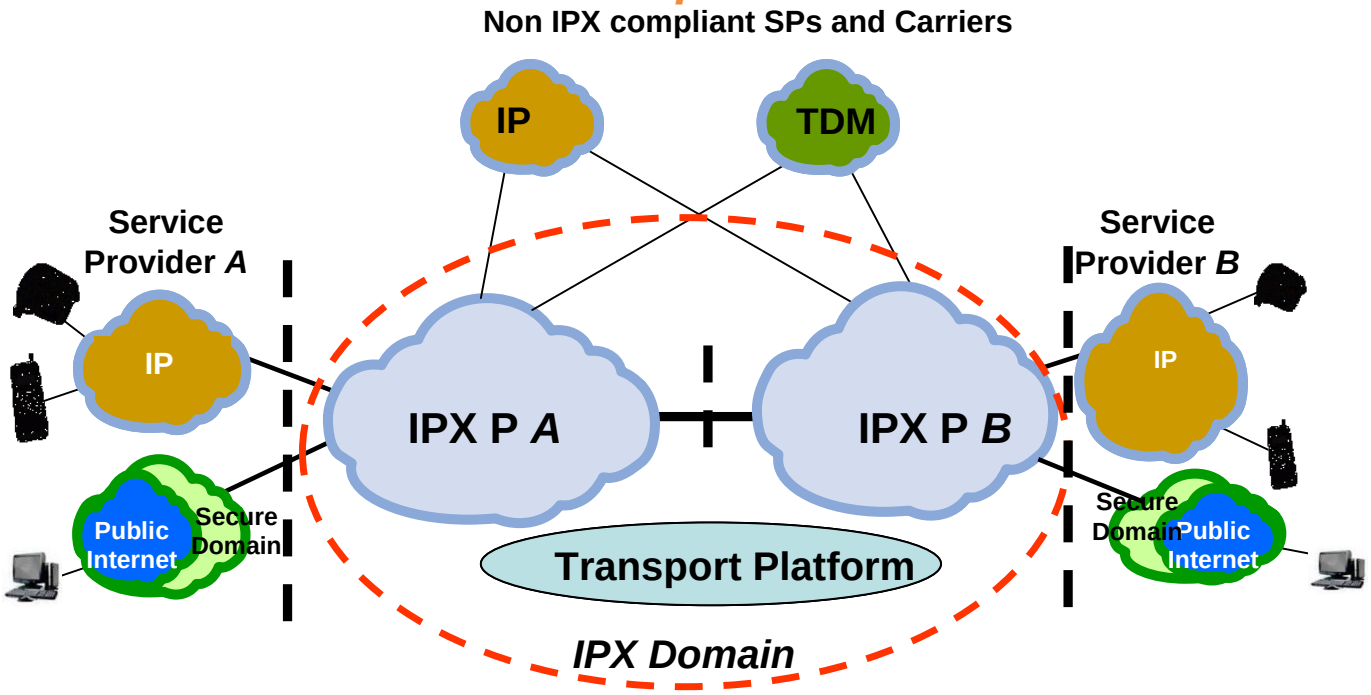
	Market VoIP Private	Market VoIPX (current view)
Type of Traffic	In general high quality traffic	Trend to qualify as VoIPX top quality traffic on the direct route between 2 countries

Low difference

High difference

i3f IPX Core Document

"IPX common functionalities and capabilities of an IPX Platform" **Rel.1.2 2013**



- IPX architecture and interconnection configurations
- IP routing and forwarding: standard/coding for routing, addressing, marking the IP packet
- Security: mechanism to be implemented for each interface
- QoS: measuring model, parameters' definition and related metrics
- Service Routing: "confined routing" and "break-in/ break-out" scenarios.

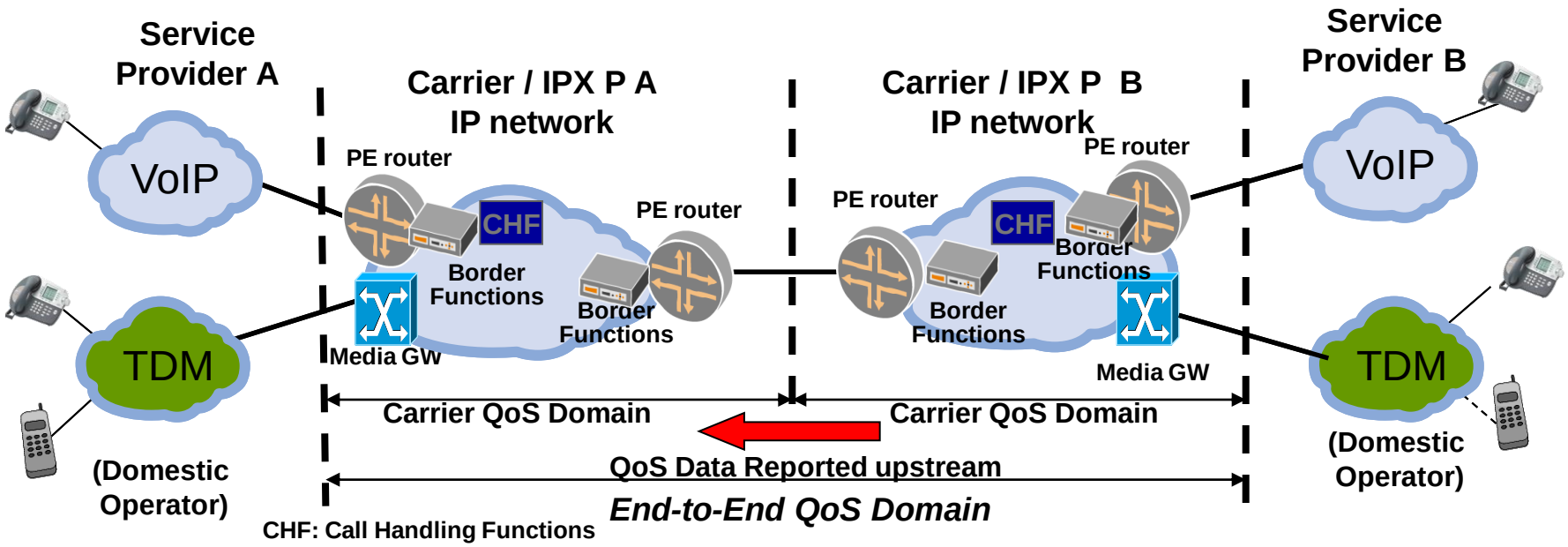
i3f VoIPX Service Schedule

"Voice over IPX service schedule" **Rel.1 2013**

Main features

- Connectivity modes: **Transit, Hubbing**
- Signalling protocols: **SIP-I and SIP**
- Codecs:
  - Mandatory: G.711 and G.729 family
  - Optional: WB-AMR, G.722
- Security: **mandatory SBC plus other actions**
- Quality of service (QoS):
  - measuring model based on Aggregation
  - parameters' definition and related metrics
- Routing
  - **Transparency of routing:** direct, indirect, break-out
  - Recommended "confined" within IPX domain unless break-out is agreed
- Charging: **no obligation to provide separation of termination rate and transit fee** unless commercially negotiated

A technical issue: QoS Control

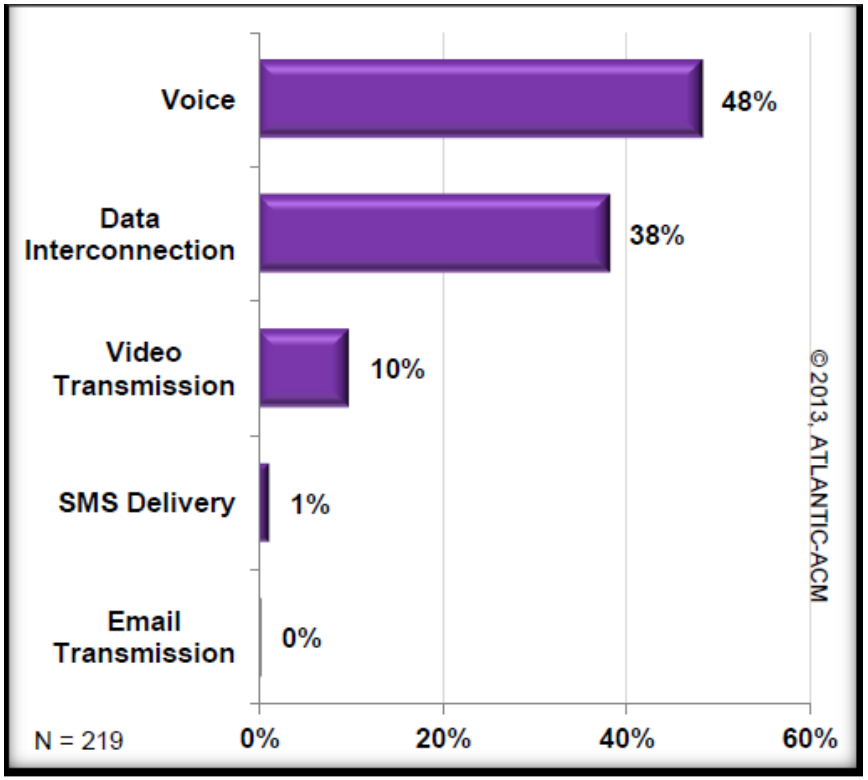


- **No reliable, accurate solution available** (RTCP works for specific configurations)
- **"Aggregation" method** as a possible workaround (GSMA AA.81 quotes it)
- **"Media loopback" method** as a possible future solution (IETF released RFC)
- Some issues still to be solved: which number to call, who pays the testing calls?

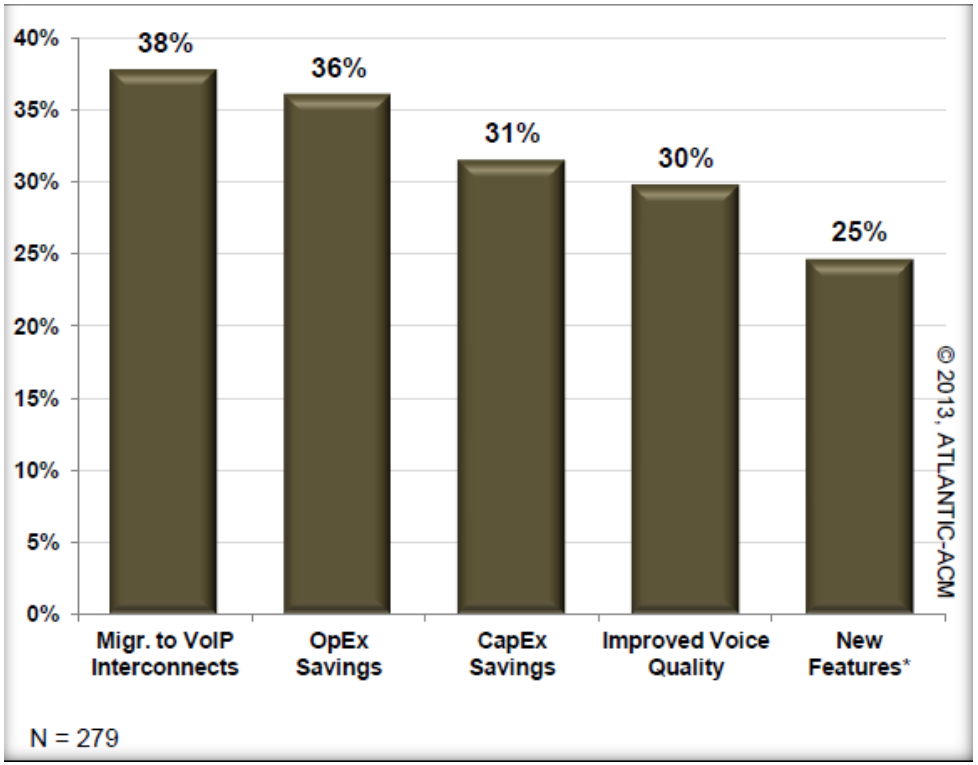
Services / Drivers for IPX

Source: ATLANTIC-ACM 2013 Global Wholesale Survey

Services to benefit from IPX offering



Drivers behind IPX strategy



Opportunities for the Industry

An IPX platform is the best candidate for the support of reliable, trusted and QoS controlled services

- GSMA “Future of Interconnect” initiative
- Multiple Pilots / Commercial services launched by Carriers
- Strong push expected by LTE / VoLTE deployment

Voice

HD Voice

(HD) Video conferencing

IPX Transport

Data roaming

SMS/MMS

Global Signalling

LTE Data Roaming

SIP Services (over IMS)

VoLTE

Video over IMS

Thank You

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David Fang

Sr. Marketing Director

Huawei

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Alessandro Forcina

Technical Aspects Workstream Chairman

Telecom Italia Sparkle

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IPX Panel Discussion

Panelists:

David Fang, Sr. Marketing Director, Huawei

Christian Michaud, Senior Vice President, Product & Business Strategy, Global Voice Solutions, Tata Communications

Ian Pannell , Deputy CTO, GSMA

Kervin Pillay, Solution Architect , Acme Packet

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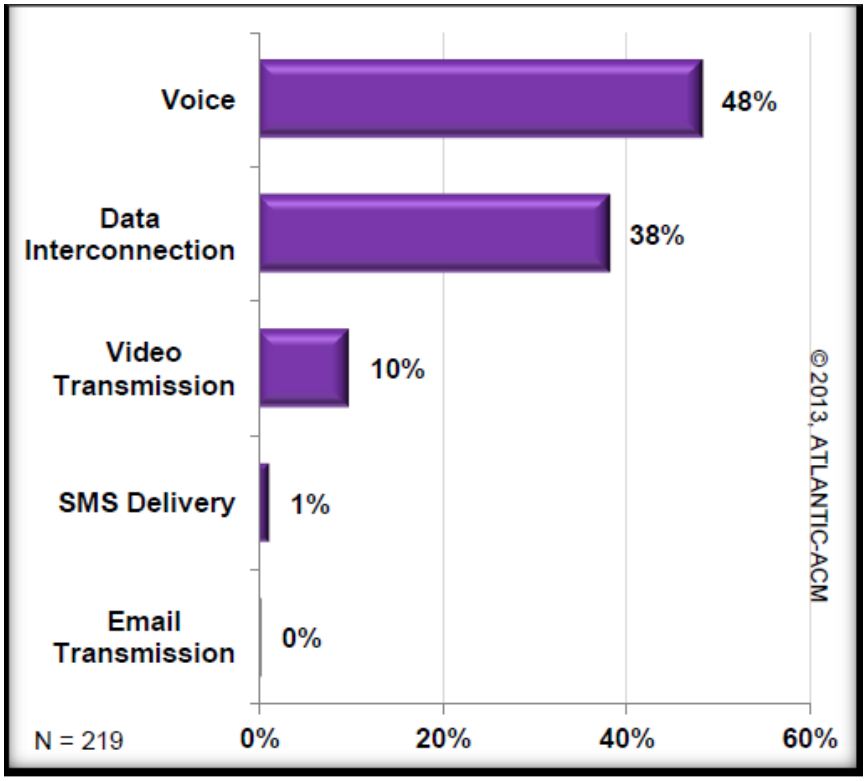
Services to be supported from IPX

Source: ATLANTIC-ACM 2013 Global Wholesale Survey

Services to benefit from IPX offering



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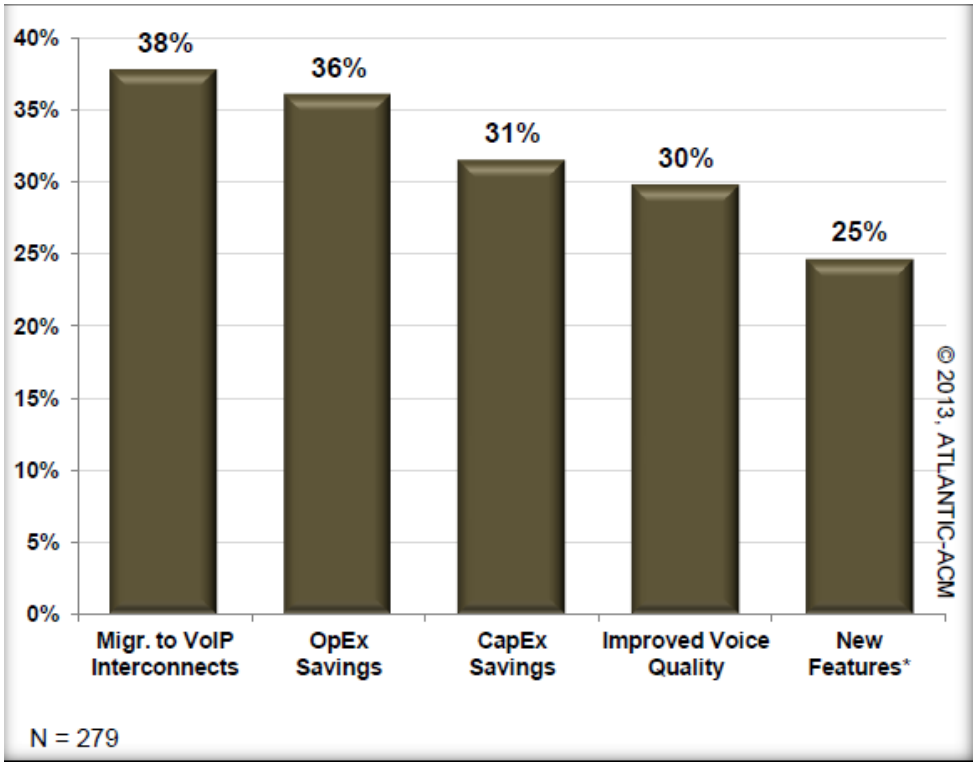

Some topics to be discussed

1. How does IPX differ from other IP-based interconnection models?
2. Should cascading business model be applied to all services?
3. IPX technical challenge: E2E QoS control?
4. IPX vs. LTE (VoLTE): the perfect “marriage”?
5. IPX supporting video services or other future services (WebRTC): easy / difficult task?

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Session on VoLTE/IMS/LTE

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Christopher Lengyel

Director of Strategic Marketing,

iBasis

Moving Towards LTE

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Agenda

- LTE Market Landscape
- LTE Data Aspects
- LTE Voice Aspects
- Panel Q&A

LTE Is Disruptive!

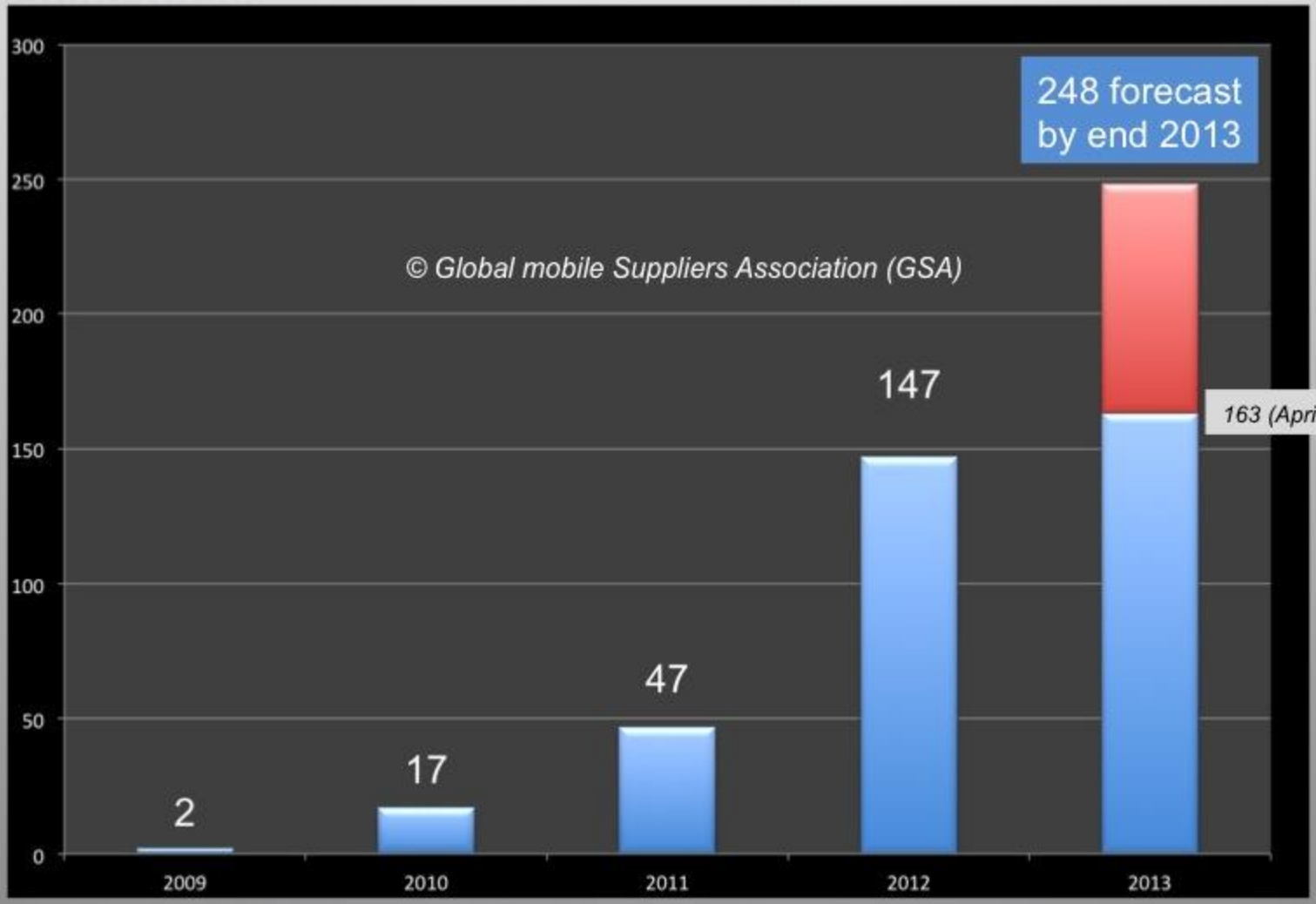
- Commercially
- Technically
- For Mobile Operators
- For Wholesalers/IPX Providers

LTE Drivers

- **Smartphone/tablet usage** created users that use data apps whenever, wherever
- Need for **seamless user experience** when traveling between geographic boundaries
- New **roaming regulations** driving end-user pricing down and traffic up

Commercial LTE network launches
- cumulative totals

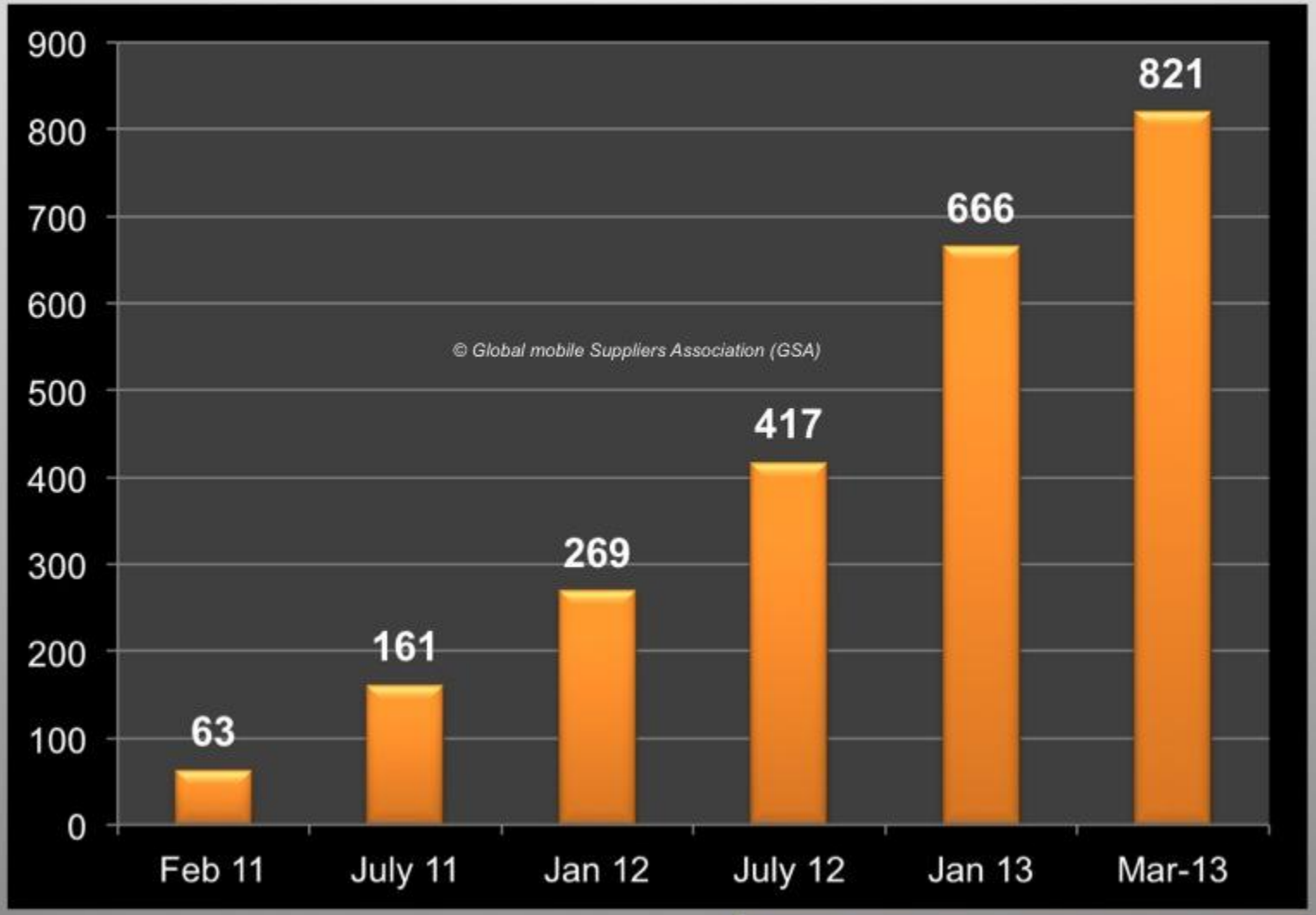
www.gsacom.com



Source of data: GSA Evolution to LTE report – April 7, 2013
www.gsacom.com

LTE user devices growth

www.gsacom.com



LTE terminals announcements as confirmed in GSA reports up to March 27, 2013

Source : Status of the LTE Ecosystem reports 2011 - 2013

LTE Challenges

- Lack of multi-band LTE devices to overcome fragmented frequency spectrum
- New signaling standards introducing interoperability issues
- New LTE operators without 2G/3G interworking
- All IP interconnect, requiring infrastructure overhaul
- Charging models are changing (home routing versus local break out)

Apple penalized $2.22 million for misleading iPad 4G ads

Summary: *Apple's new iPad: 4G? Not in Australia. The marketing misstep will cost Cupertino $2.22 million.*

By Andrew Nusca for Between the Lines | June 8, 2012 -- 02:24 GMT (19:24 PDT)

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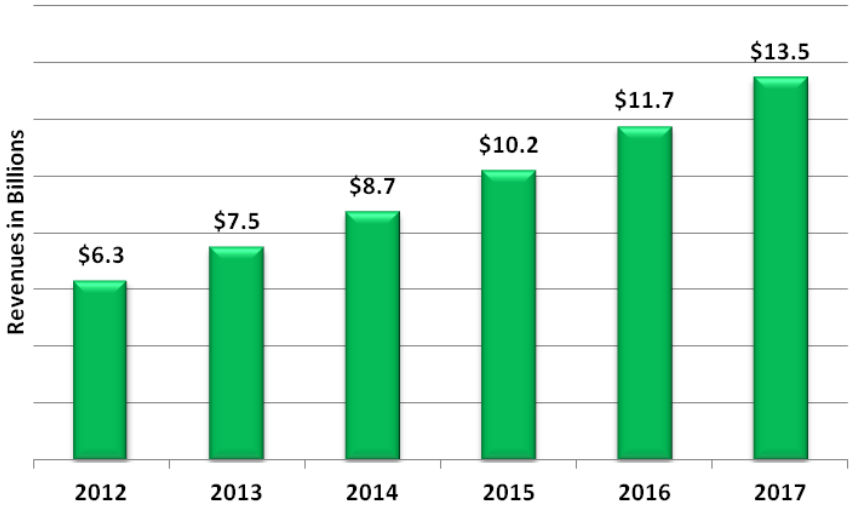
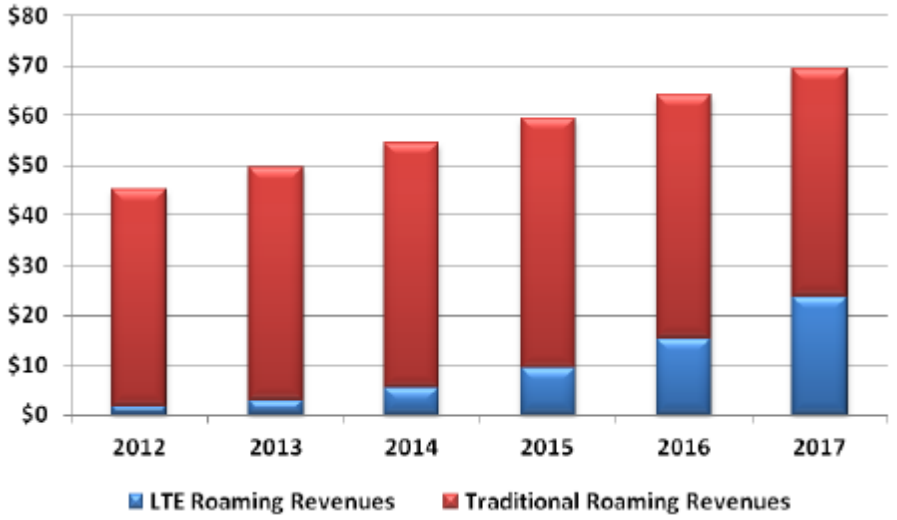
Apple told Australians that its new **iPad** was "4G," even though it didn't operate on their country's 4G networks.

North America set for growth in roaming

North America Roaming Revenues Forecast 2012-2017 (US$ Billions)



Global Roaming Revenues – LTE vs. Traditional Roaming Forecast 2012-2017 (US$, Billions)



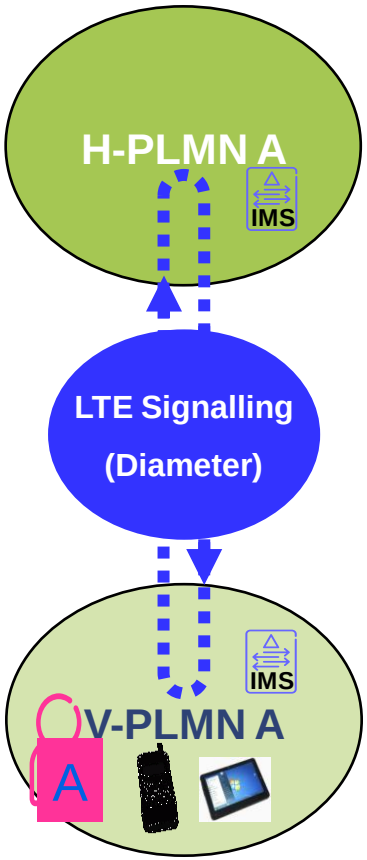
Source: VisionGain 2012

North America has the *fastest growth rate* in roaming revenues: 16.5% vs. 9.0% globally

LTE Roaming Hotspots

- US and APAC taking the lead – Europe lagging behind
  - LTE Roaming just beginning – Korea, Japan, US, Canada has World's first LTE Roaming product commercially live
  - Islands of commercial LTE roaming beginning to surface
  - US; Korea, Sing, HKG in Asia; Russia, Nordics in Europe; Middle East

Roaming scenario in LTE: registration



Signalling	2G/3G	LTE
Network registration	MAP	Diameter

- 4G signaling changes from SS7 MAP to IMS Diameter signaling
- Challenges for MNO and IPX Providers
  - Interoperability, mediation, interworking
  - Massive IMS investment

On Our Way To VoLTE

Standard Definition Voice
(NB Codec, 2/3G CS)

HD VOICE
(WB Codec, 2/3G CS)

GSMA VoLTE
(NB/WB Codec, 4G PS)

- Deployment of LTE networks enables mobile operators to move beyond current PSTN voice technology and quality => VoLTE
- End users will experience a more immersive communications and a secure, HD experience

46.3%
OF OPERATORS PLAN TO INTRODUCE VOLTE WITHIN A YEAR OF COMMERCIAL LTE LAUNCH
Source: Telecoms.com Intelligence February 2013 Survey

"… voice will still account for more than half of all mobile operator revenues out to 2017, when global revenues are expected to hit $1.18tn …" – Ovum, February, 2013

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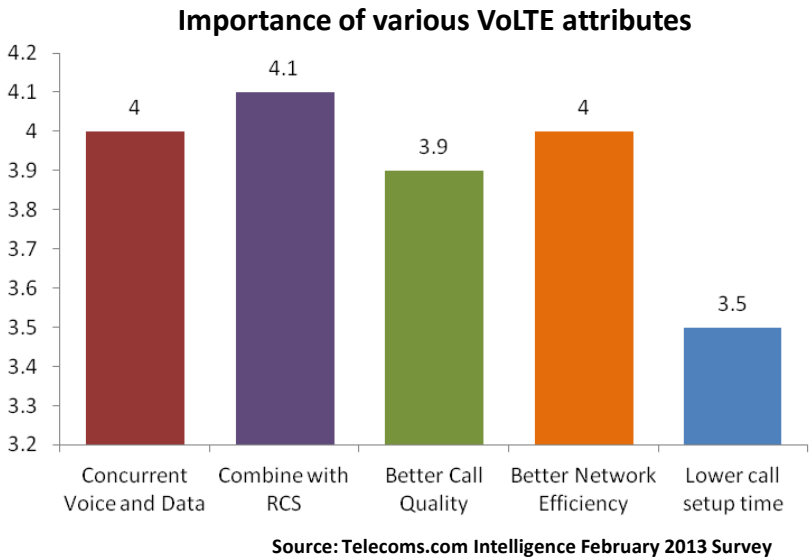
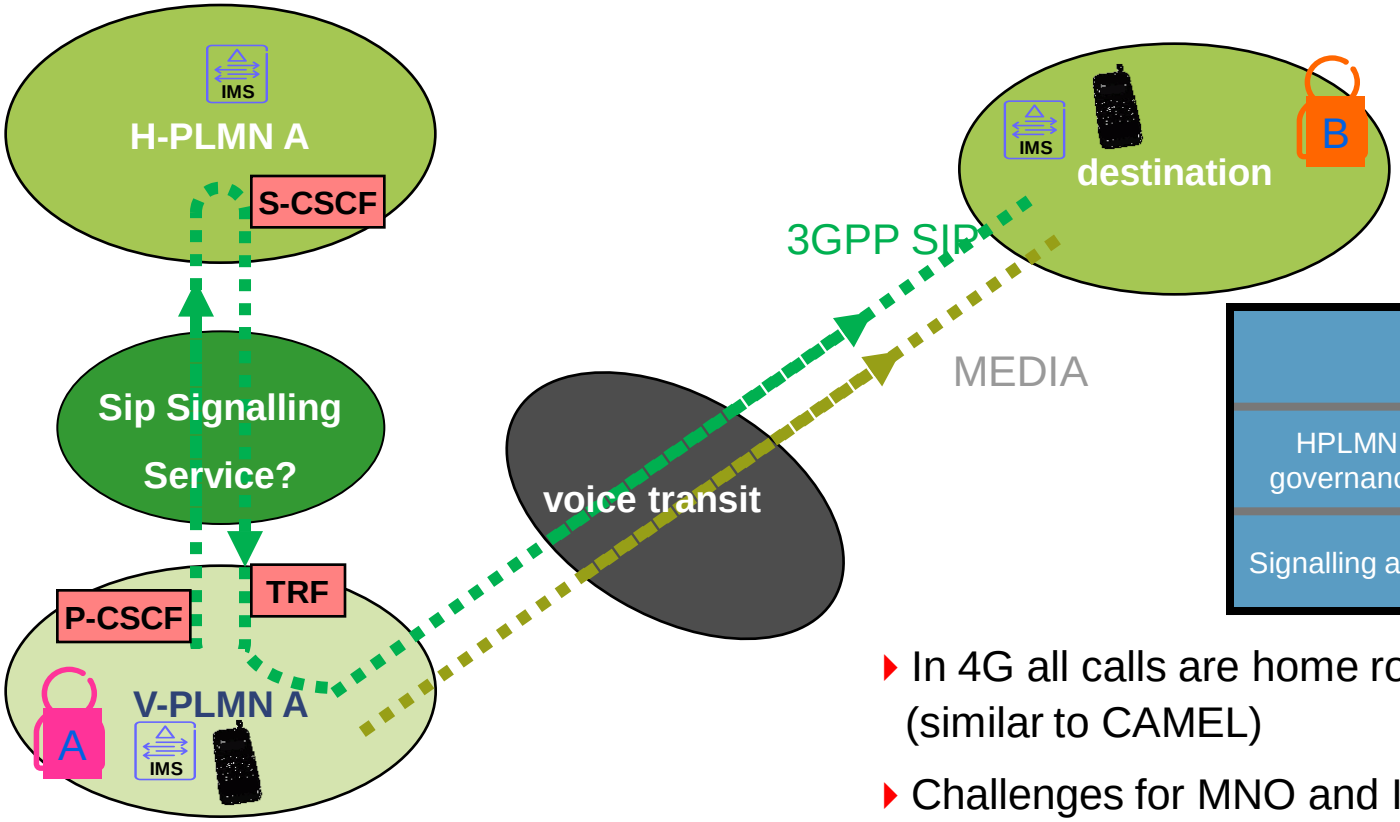
VoLTE Advantages

- Network Efficiency
- Multi-voice codec support
- Improved voice quality AMR-WB
- Simplified handsets
- Leverages lower cost IP infrastructure
- Provides frequency re-farming opportunities



Source: Telecoms.com Intelligence February 2013 Survey

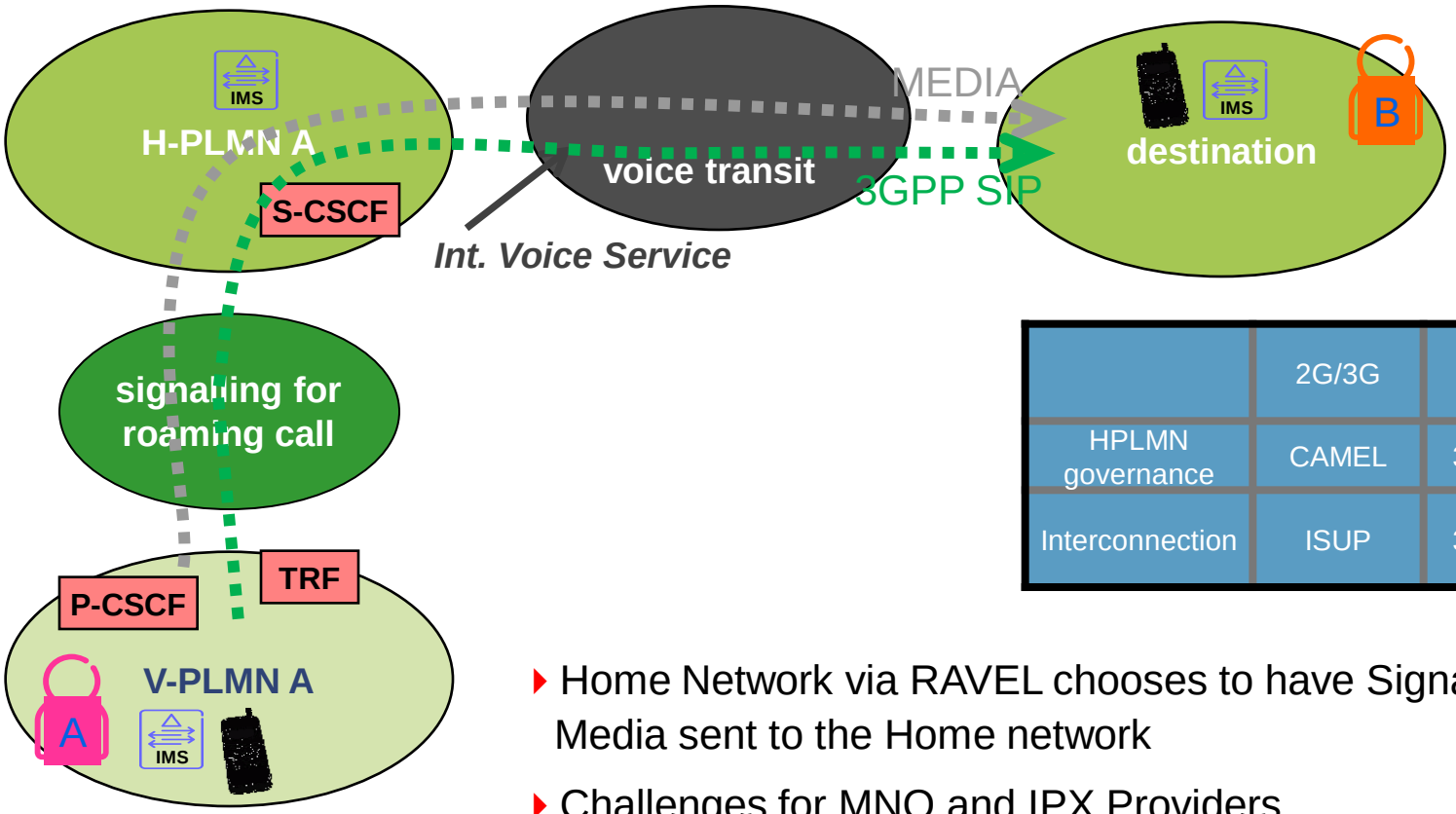
Roaming scenario in LTE: making a call
1st Alternative (per call): local break-out (RAVEL)



	2G/3G	LTE
HPLMN governance	CAMEL	3GPP SIP
Signalling at IC	ISUP	3GPP SIP

- In 4G all calls are home routed using SIP-IMS (similar to CAMEL)
- Challenges for MNO and IPX Providers
  - Interpreting RAVEL headers
  - Potential home network control over routing choices in visited network
  - Charging for signaling service

Roaming scenario in LTE: making a call
2nd Alternative (per call): home routing



	2G/3G	LTE
HPLMN governance	CAMEL	3GPP SIP
Interconnection	ISUP	3GPP SIP

- Home Network via RAVEL chooses to have Signaling and Media sent to the Home network
- Challenges for MNO and IPX Providers
  - How does media reach H-PLMN?
    - Using same IC as for signalling for roaming, or
    - Using a separate IC for media and voice signalling

i3forum Actions

- IMS – “Interconnection & Roaming IMS Signalling Profile”
  - 2012 work cycle focused on interpreting interconnection
  - 2013 work cycle will focus on roaming scenarios
- VoLTE
  - 2012 work cycle – liason statement to 3GPP CT-3 regarding SIP Route Header in roaming and non-roaming cases
- LTE Roaming
  - 2013 work cycle – “LTE Roaming Service over IPX

Thank You

VoLTE/IMS/LTE Panel Discussion

Panelists:

Conor Clarke, Director of International Business, Digicel

Finn Kornbo, Product Director, CSGi

Andreas Mann, Commercial Manager, Vodafone

Natasha Tamaskar, VP, Global Strategic Genband

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VoLTE/IMS/LTE

Panel Discussion

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Lunch

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Session on Fraud Control and Management

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Katia Gonzalez Gutierrez

Fraud Manager and Revenue Assurance Product Manager,

BICS

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Agenda

Context
Workstream scope of activities
Best Practices
Compliance Charter
Conclusion

Context

- Started in Sept 2011
- Increase of fraud cases impacting wholesale carriers and its customers
- Goal:
  - show the Industry that i3F recognizes this situation
  - Show the carrier Industry willingness to join forces and fight fraud
  - show the way to a fraud-less IP eco-system
- Regulatory initiatives & customer behavior show the need for common guidelines on the wholesale arena

Scope of activities

- Focus on wholesale
- Objective:
  - define best practices for wholesale carriers
  - share information within the group
- Collaborations:
  - FIINA
  - GSMA IWG & FF
  - GSC

Best practices

- i3F recognizes :
  - the interest in analyzing traffic & informing the upstream and downstream parties in case of suspicious traffic
  - that disputing & withholding payments can be justified to impact fraudsters under certain conditions:
    - Dispute only the fraudulent portion of traffic
    - Fraud needs to be substantiated
    - Respect timeframes
    - Complete information
- Process applied on best-effort
  - customer remains liable for the traffic sent

Best practices

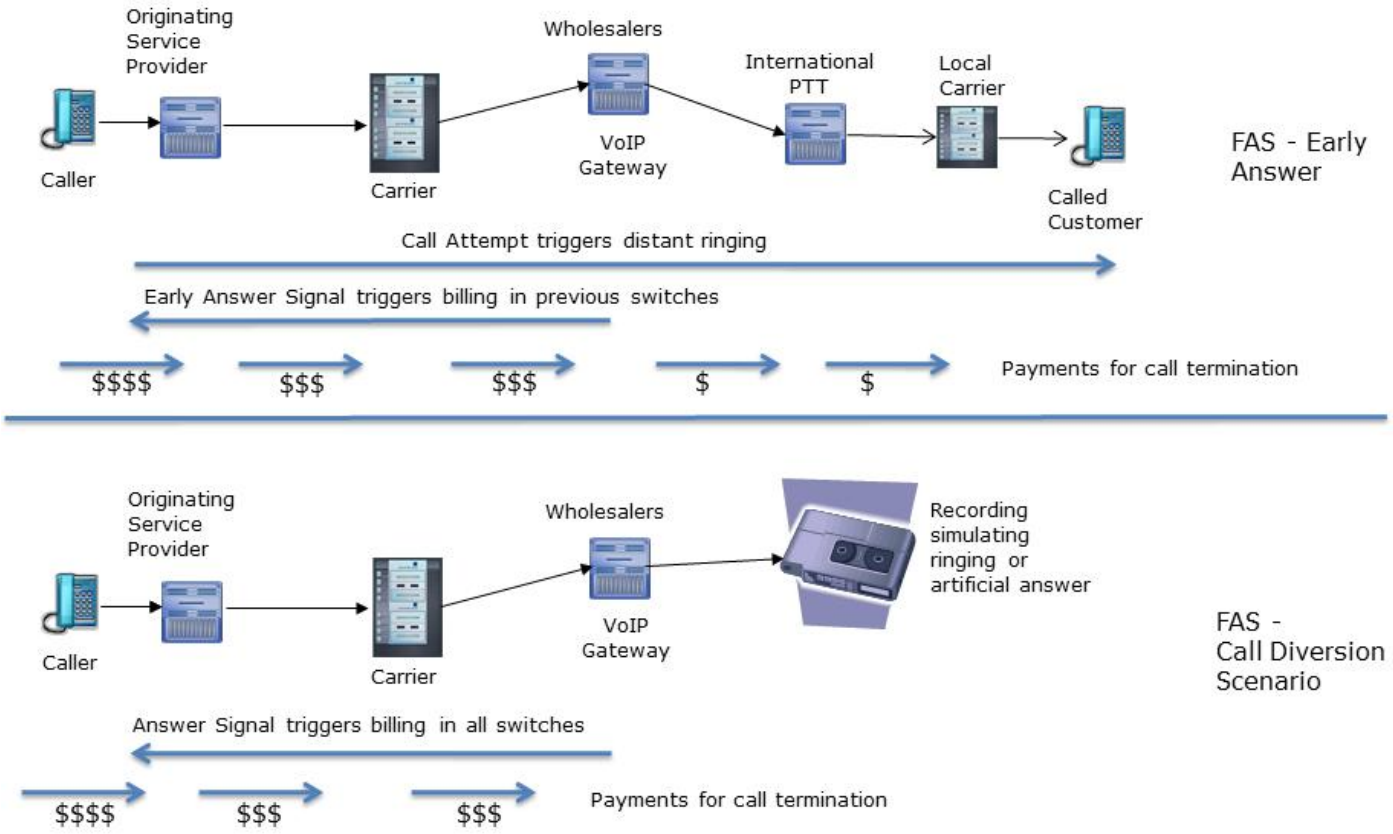
- Prerequisites to consider disputes due to fraud:
  - CDR analysis
  - Fraud description based on CDR analysis
  - Official fraud letter from the customer operator
  - Official document, issued in the name of the customer company by one of the customer Chief Officers, stating that the operator has not been paid or has had a loss (quantified) for the specific portion of traffic that is disputed
  - Police or other law enforcement authority report

    →Timely

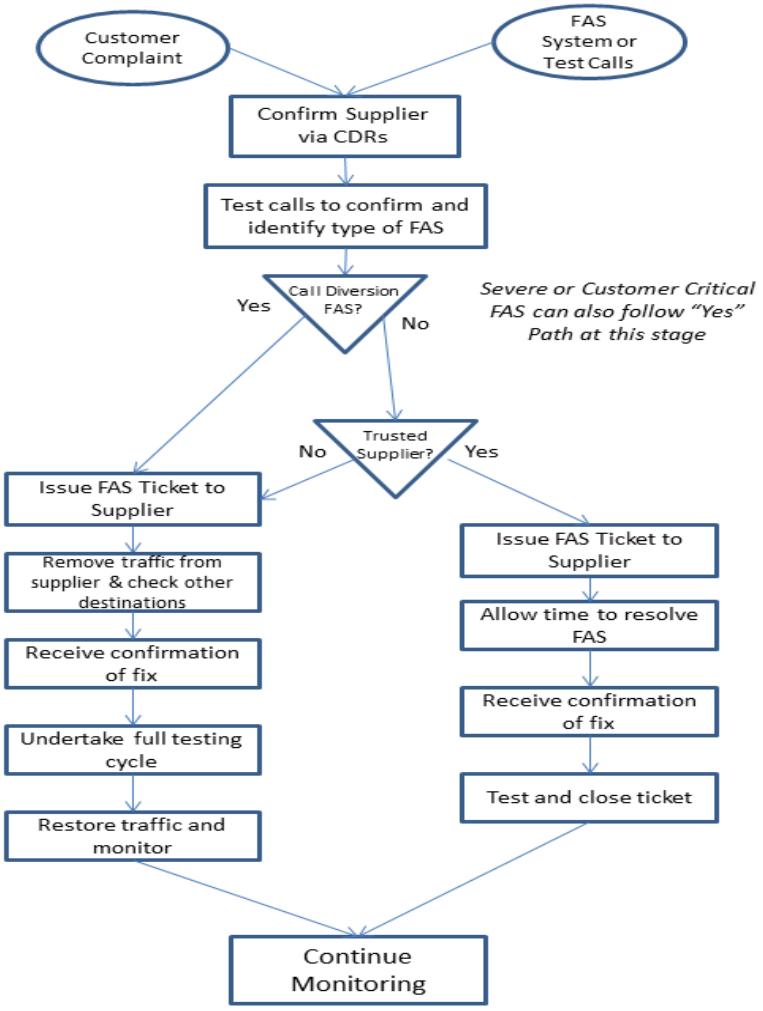
Best practices

- Fraud :
  - Call hijacking
  - False Answer Supervision
  - Hacking of a telephone system / software manipulation
  - International Revenue Share Fraud
  - Calls to manipulated B-nbrs (CC manipulation)
  - Wangiri fraud (missed call campaign)
- Fraud-like:
  - Arbitrage
  - Insolvency of a service provider and or of another operator
  - Call Selling (traffic brokering)

Best practices: FAS



Best practices: FAS



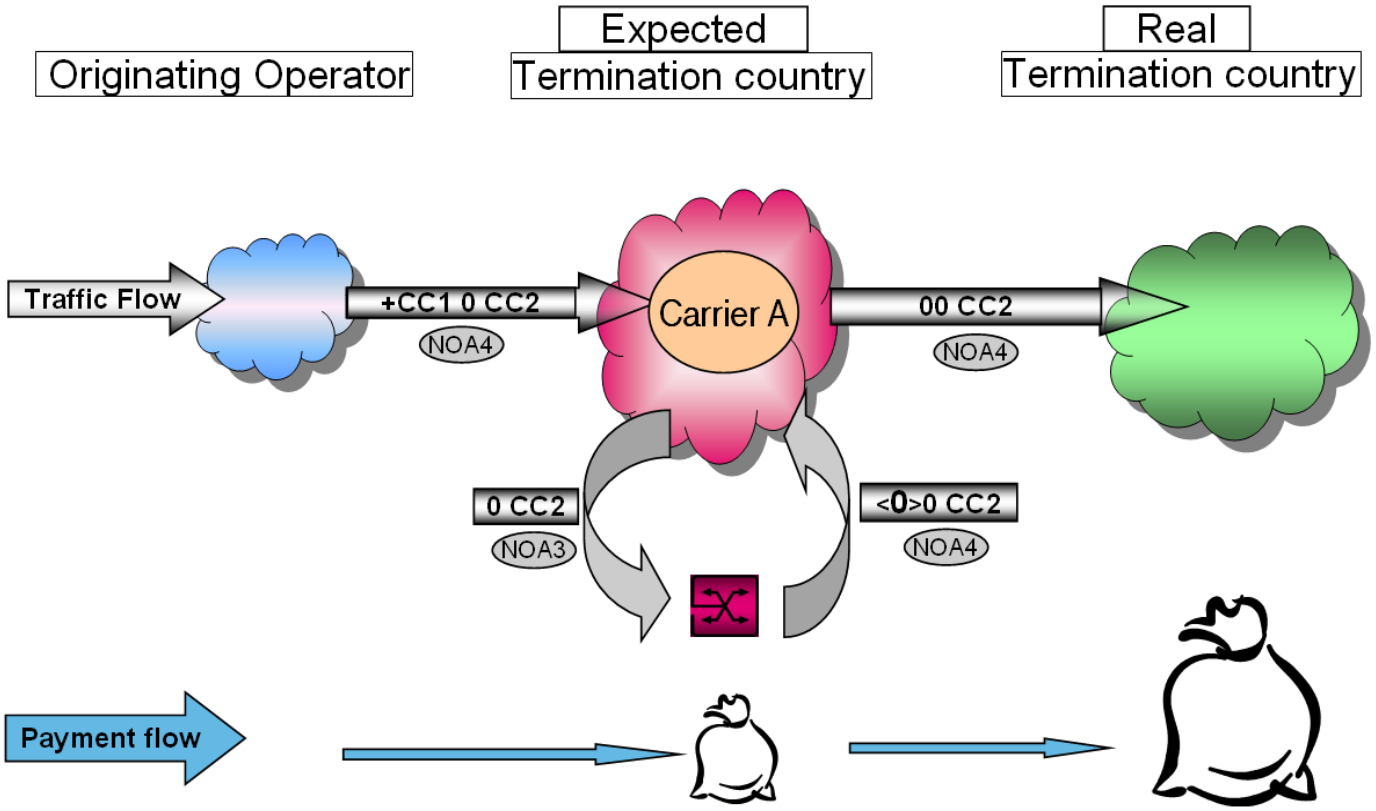
Outline Process for FAS Remediation

False positives (ie suspecting FAS when the cause is an increase in answering machine terminations) must be rigorously identified to avoid penalizing an innocent supplier

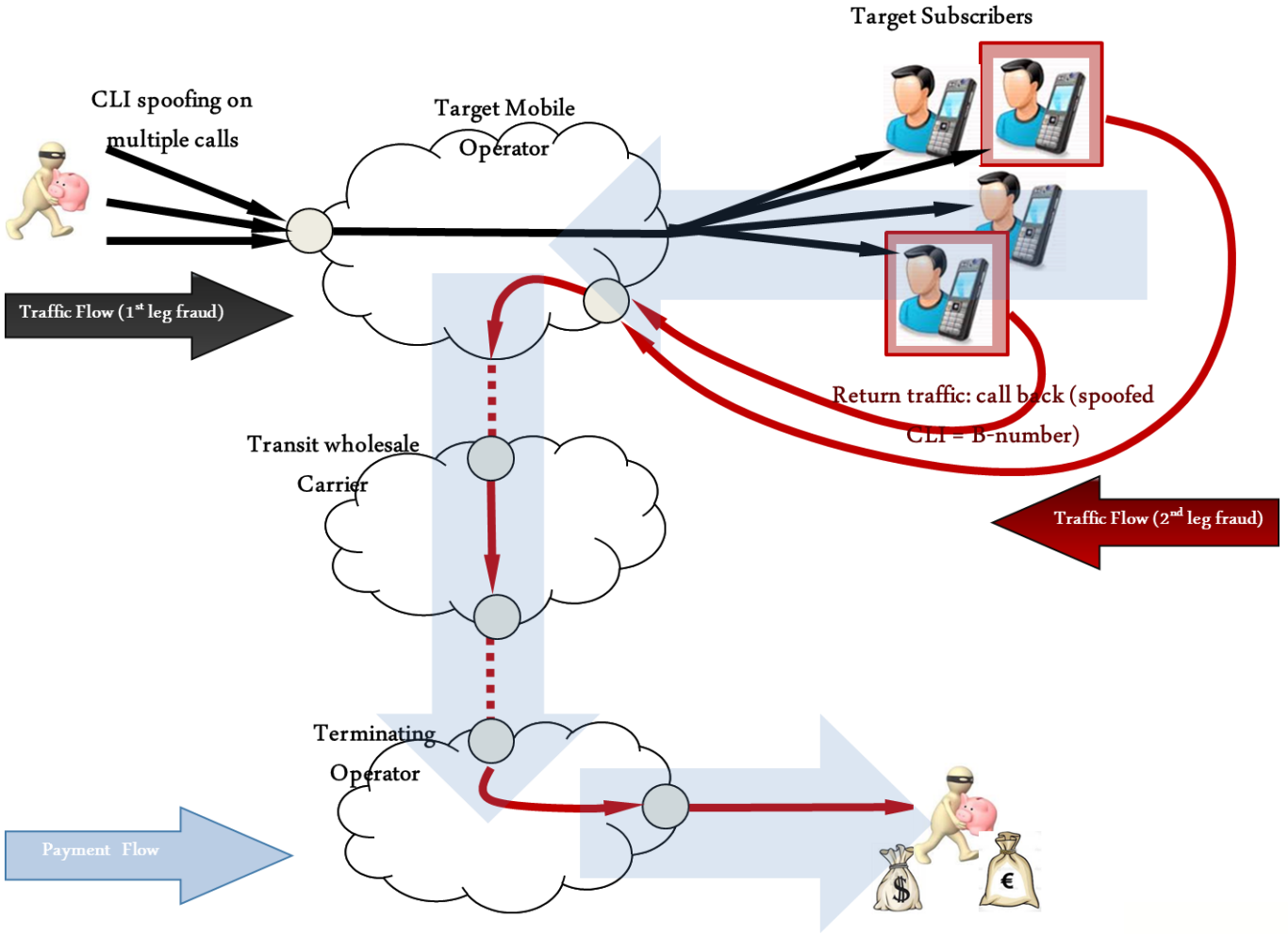
Best practices: FAS

- Approaches to detect:
  - Compare measured call duration via a supplier with the expected call duration
  - Short duration calls followed by repeat attempts
  - Analyse the answer delay to identify “machine-answered” calls
  - Analyse the volume of charged calls vs initiated calls (call seizure rate) and compare to the expected
  - Customer complaints
  - Probe-based FAS detection: Sample calls
  - Statistical FAS detection: call pattern analysis
- Approaches to avoid:
  - carefully checking suppliers on activation
  - closely monitoring their performance
- Dispute handling:
  - the recommended measures currently consist of informing the supplier and removing the supplier from the route

Best practices: CC manipulation



Best practices: Wangiri fraud



Scope of activities

- Focus on wholesale
- Objective:
  - define best practices for wholesale carriers
  - share information within the group
- Collaborations:
  - FIINA
  - GSMA IWG & FF
  - GSC

Share information: compliance charter

- Compliance with antitrust and other law requirements
- Extract (preambule)
  - *As communications carriers, the members of the i3 forum have the right and responsibility to protect themselves, their services and their customers against abuse and other illegal activities.*
  - *This Charter outlines the standards of conduct that members of the i3 forum Fraud WS agreed to adopt in order to promote ethical conduct and to work in compliance with antitrust legislations and compliance in all activities connected to the Forum.*

Fraud Control and Management Panel Discussion

Panelists:

Peter Coulter, Executive Director Global Fraud Management, AT&T

Robert Benlolo, Senior Product Manager of Access Services, TATA Communications

David Goldenberg, AVP Commercial Wholesale, cVidya

John Brooks, Vice-President Product Management, Subex

Steve Heap, Senior Technology / Communications Executive, IPSoft

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Question 1

Short introduction of your organization's / company's perspective in the common goal to "fight fraud" and link with i3forum fraud workstream

Question 2

How do you assess i3forum's fraud workstream's work and potential impact on the industry?

Question 3

Do you see mayor differences between fraud from a wholesale perspective vs a retail perspective?

Question 4

Do you see IP and VoIP as an ‘enabler’ for an increased volume of fraud in the industry?

If so, what kind of fraud scenarios are the most impacted?

Question 5

Can the existing FMS cope with fraud from a wholesale perspective?

Question 6

Which hot subjects should from your point of view be looked at by the i3forum's workstream for next years activities?

Closing Word for each

Thank You

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Session on HDVC

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Carlos Da Silva

Director, Product Business Development,

PCCW Global

HDVC over IPX, an opportunity for carriers and users

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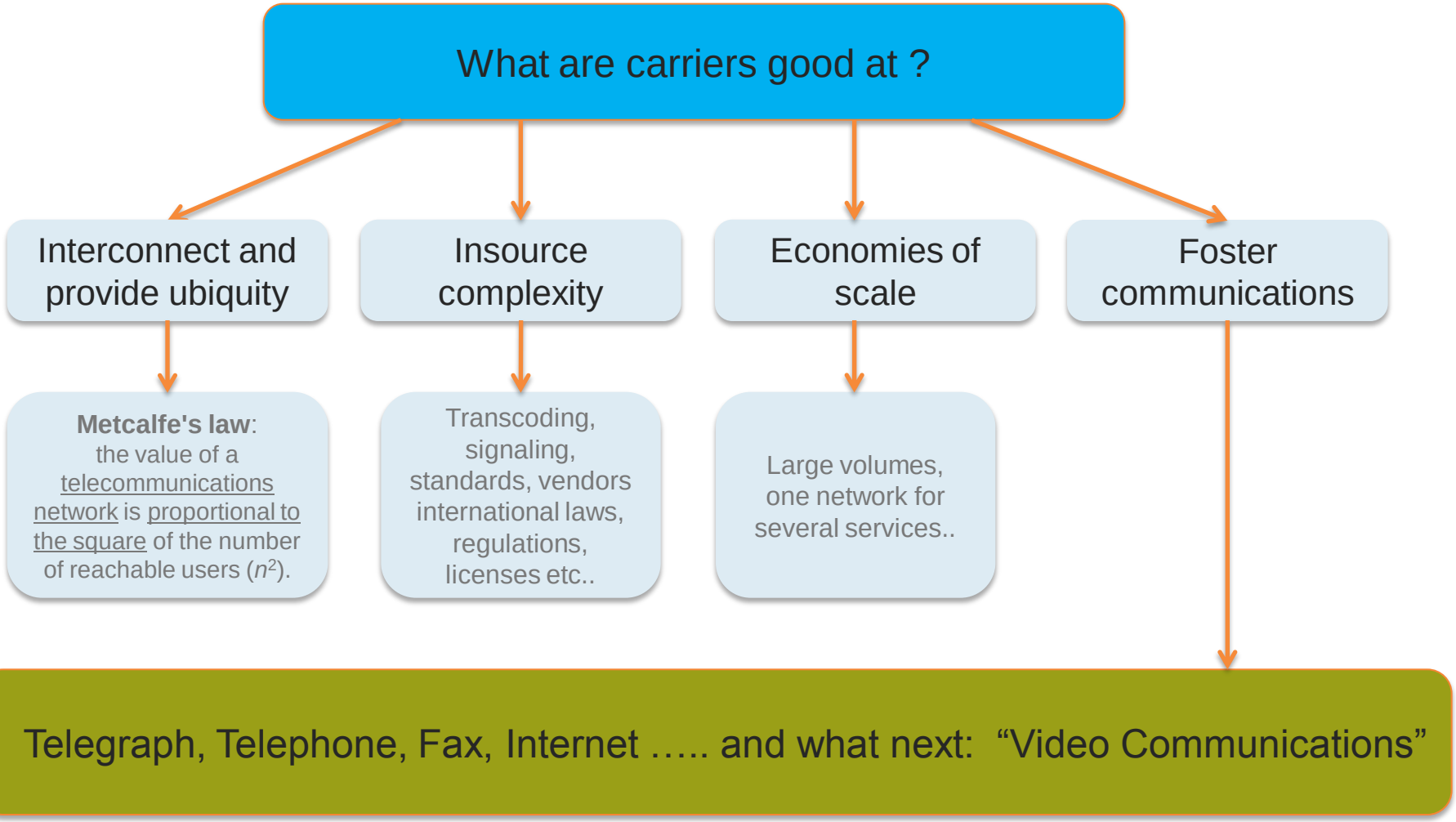
The DNA of carriers' "know how" and products

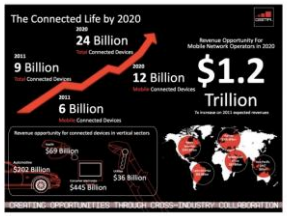


The video market does not provide ubiquitous QoS IP interconnects

High-end HD conference market
is growing with double digits

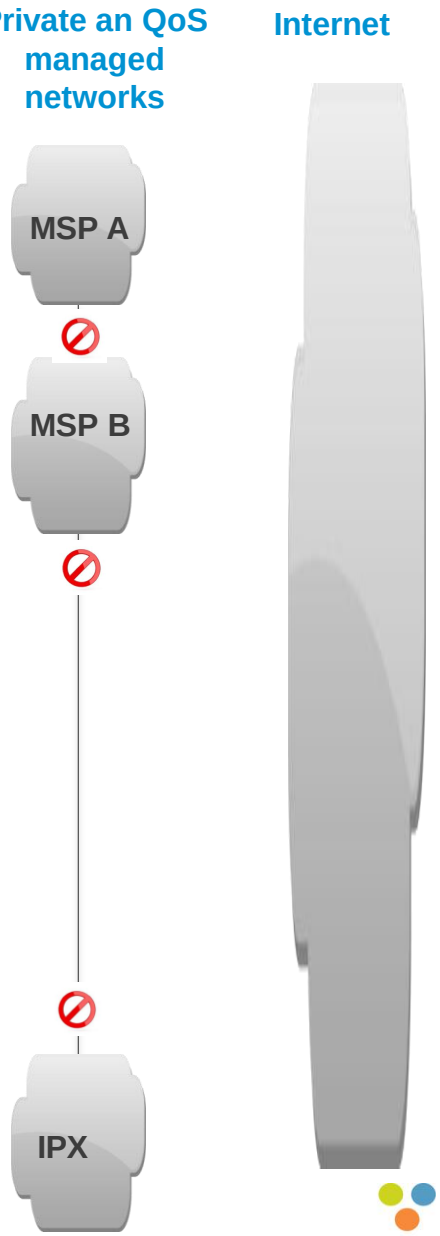
Point-to-point HD video call
has a demand but no market offering yet

More and more new TV sets come
with Skype built-in



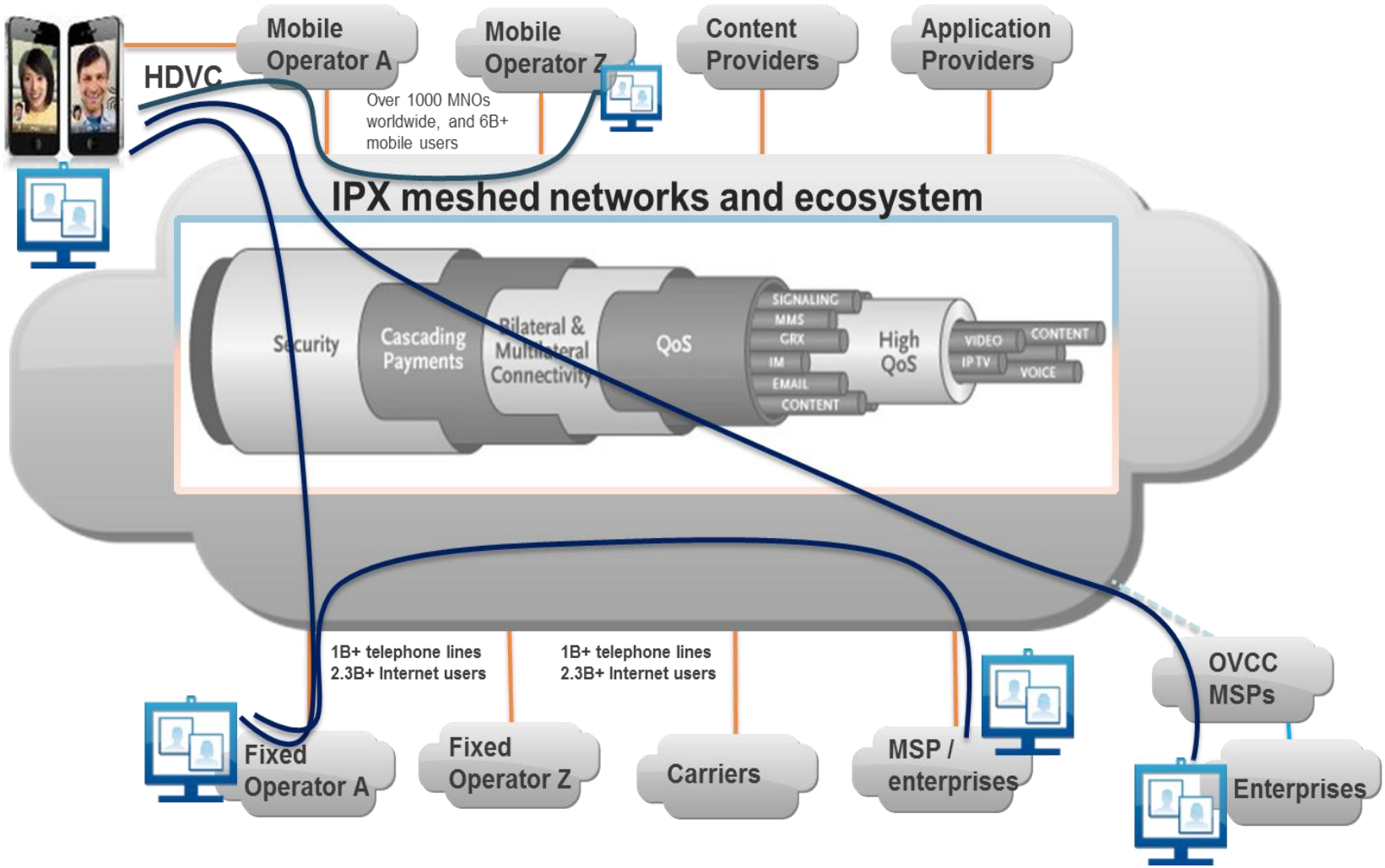
Number of mobile devices do not stop growing
and every new one comes with an HD camera

Fiber and 4G will give greater access bandwidth
and spur new usages



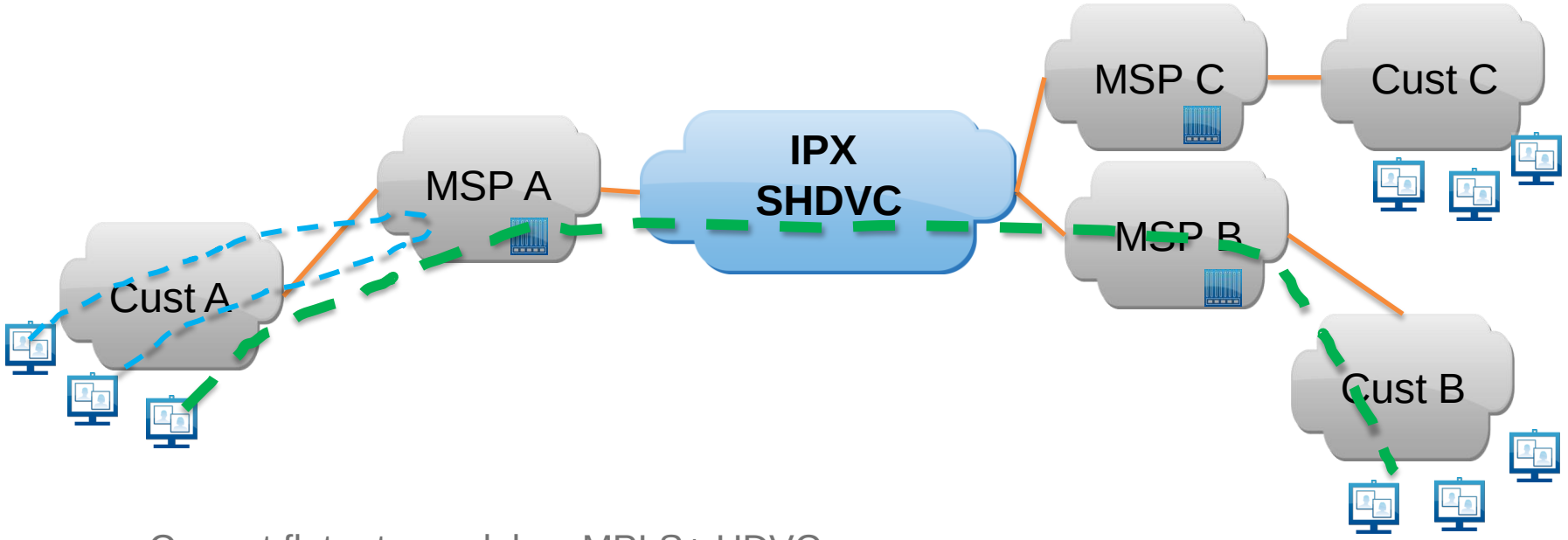
Switched HDVC over IPX

HDVC for an end-user means HD Video Conferencing or HD Video Call (point-to-point). For carriers and IPX providers, HDVC is always about routing/swicthing an HD Video call from one SP to another SP, it is point-to-point.



Switched HDVC over IPX contributes to sustain a usage based model

The Telecom industry needs some services with usage base revenues to sustain costly network investments.



- Current flat rate model on MPLS+ HDVC

- Switched HDVC is based on usage based revenue generation

Carriers need to be fast to market to not miss the opportunity.

OTT players are already going to market with solutions that aim at offering ubiquitous HDVC point-point-point, vendor to vendor interoperability. They rely on the Internet availability and Best effort QoS.

Carriers cannot afford to spend too much time on the sideline thinking at when and how to move in or it will be too late

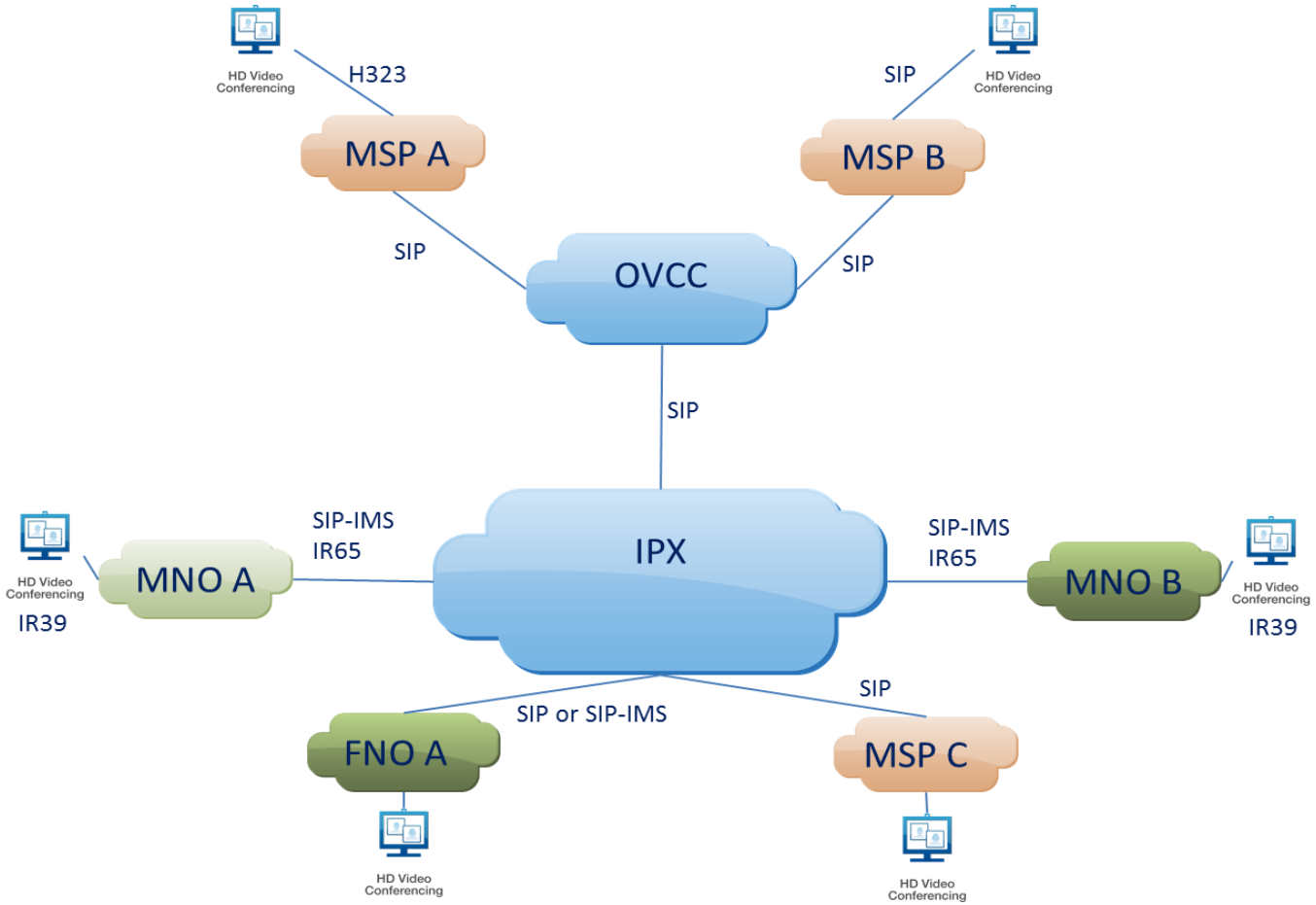
Bluejeans networks

- **System Agnostic.** We harmonize with most business and consumer video conferencing endpoints. Just tell everyone — colleagues, customers, partners, suppliers, even your social network — to BYOD (bring your own device) to your meeting.
- **Frustration-free.** Schedule and host meetings from our easy and intuitive Web interface. Just click a link or dial a number, then control the show as Administrator for a better meeting experience for all. You'll be thanked afterward.
- **Cloud-based.** All you need is a video conferencing device and someone to meet; we'll take care of the rest. Expensive infrastructure, complicated configurations and "pre-meeting practice drills" can be checked at the door.
- **Scalable and Secure.** Invite up to 25 people from anywhere in the world to connect with confidence to our secure service. Relax — we'll hold the velvet rope to guard against uninvited guests.

HDVC over IPX, the signaling challenge

Signaling interoperability, a challenge both for VoLTE and HDVC over IMS

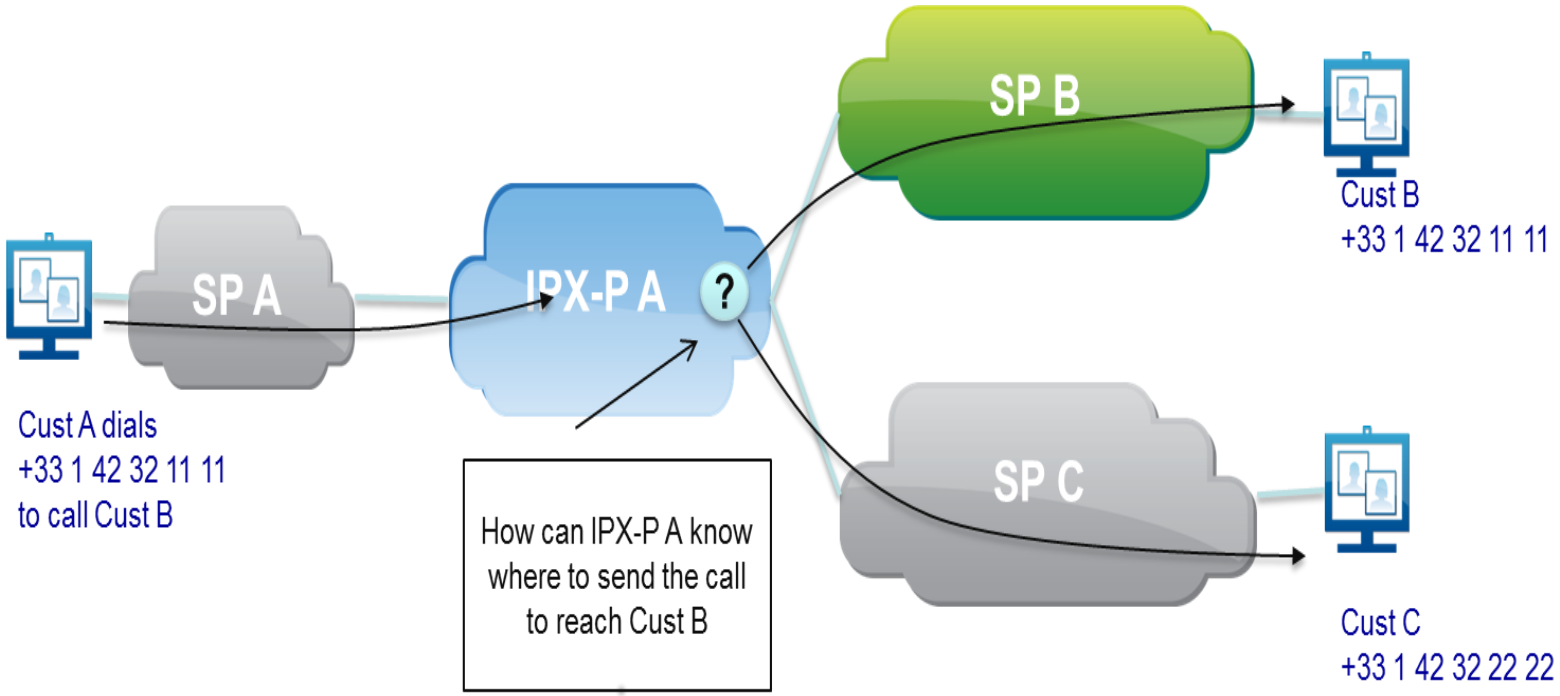
SIP to SIP calls
SIP-IMS to SIP-IMS calls
SIP-IMS to SIP calls



HDVC and HD voice over IPX, the addressing and routing challenge

For HD voice the IPX-P biggest challenge is not to be transparent to HD voice codecs, the challenge is to identify an HD voice call and terminate this call directly to the terminating HD voice SP.

For HDVC the IPX-P routing and addressing challenge is similar to HD voice, it is about identifying and routing the HDVC call towards the right terminating SP.



Requirements for a Service Provider ID

In order to route calls to the correct Service Provider, IPX providers need first be able to identify the of identify the Service Provider. **The solution is a global Service Provider ID convention, the i3forum recommends the industry to select between the AS, SPN or PEN solution.**

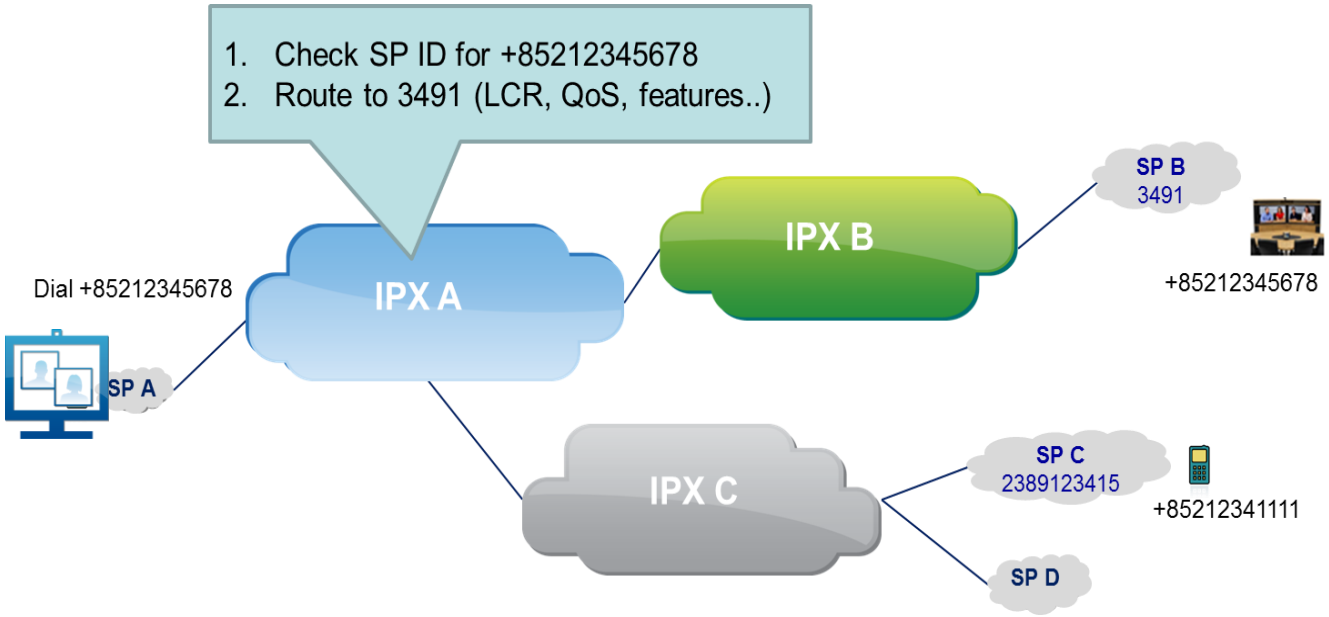
Type	Description	Possible use as a SPID
MCCMNC	GSMA mobile network identifier. 5 or 6 numeric digits long, 3 digits for the country, 2-3 digits for the network (SFR 20810, Verizon 310012)	- Not recommended
ITU International network codes	882+2 digits (88245 Telecom Italia) 882+4 digits (8825100 Inum voxbone)	- Not recommended
Tadig	GSMA billing code. 5 alphanumeric digits long, 3 digits country, 2 digits operator (SFR: FRAF2, PCCW: HKGM3)	- Not recommended
Pathfinder SPN	Pathfinder Service Provider Number Incremental string of 5 digits assigned to operators by Neustar Inc. whom manages the pathfinder database.	- maybe
ASN RFCX 1930, 6793	Autonomous System, public IP network IDs provided by IANA, 1 to 10 numerical digits	- maybe
IANA (PEN)	IANA Private Enterprise Numbers. Incremental digits with no set limits. 41719 numbers as of May 2nd 2013. http://pen.iana.org	- maybe

Which color line to choose?

How to use a SPID in an IPX Routing and Addressing system

For both HD voice and HDVC calls, the SPID is used by IPX providers to make next hop routing decisions.

- The SPs need to get/choose their own SPID
- The SPs need to make their telephone numbers mapped to a SPID in a database accessible by the IPXP



IPX ENUM database(s)

Device ID	SP ID
+85212345678	3491
+7033453241	2389123415

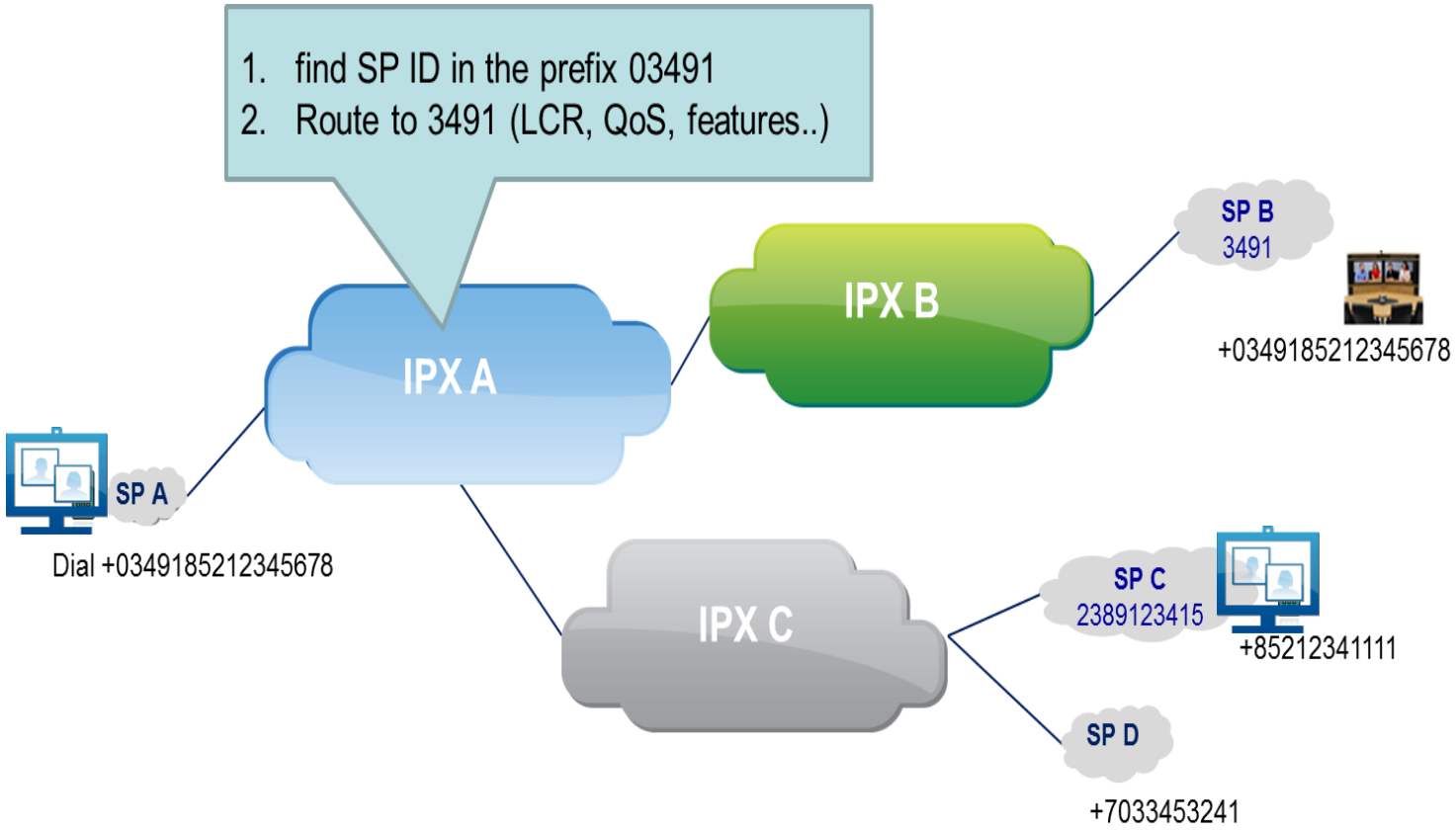
Web page, flat file SPID

SP ID	Who is
3491	SPB telecom
2389123415	SPC services

How to use a SPID as a prefix for private routing and addressing

The use of SPID for PSTN with an ENUM database will be the mid, long term solution.

In a private environment (non PSTN), the SIPD can quickly be used in a prefix model as a first step solution



Together we need to bring about the IP Future !

- I3forum will pursue internal discussions and works to enable a greater reach of High Definition Video communications with managed QoS, sustainable ecosystem, and ease of use for end-users

  - Discussion with the industry for the SPID convention selection
  - QoS, SLAs
  - Business model, procedures etc..

Keep in touch, follow us or join us for this new enabler of peoples communications

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Industry Outlook
IPX – What's The Future

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Isabelle Paradis

President

Hot Telecom

i3 forum
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HOT TELECOM

IPX – What's The Future

i3 Forum Conference

May 2013

IPX

What's

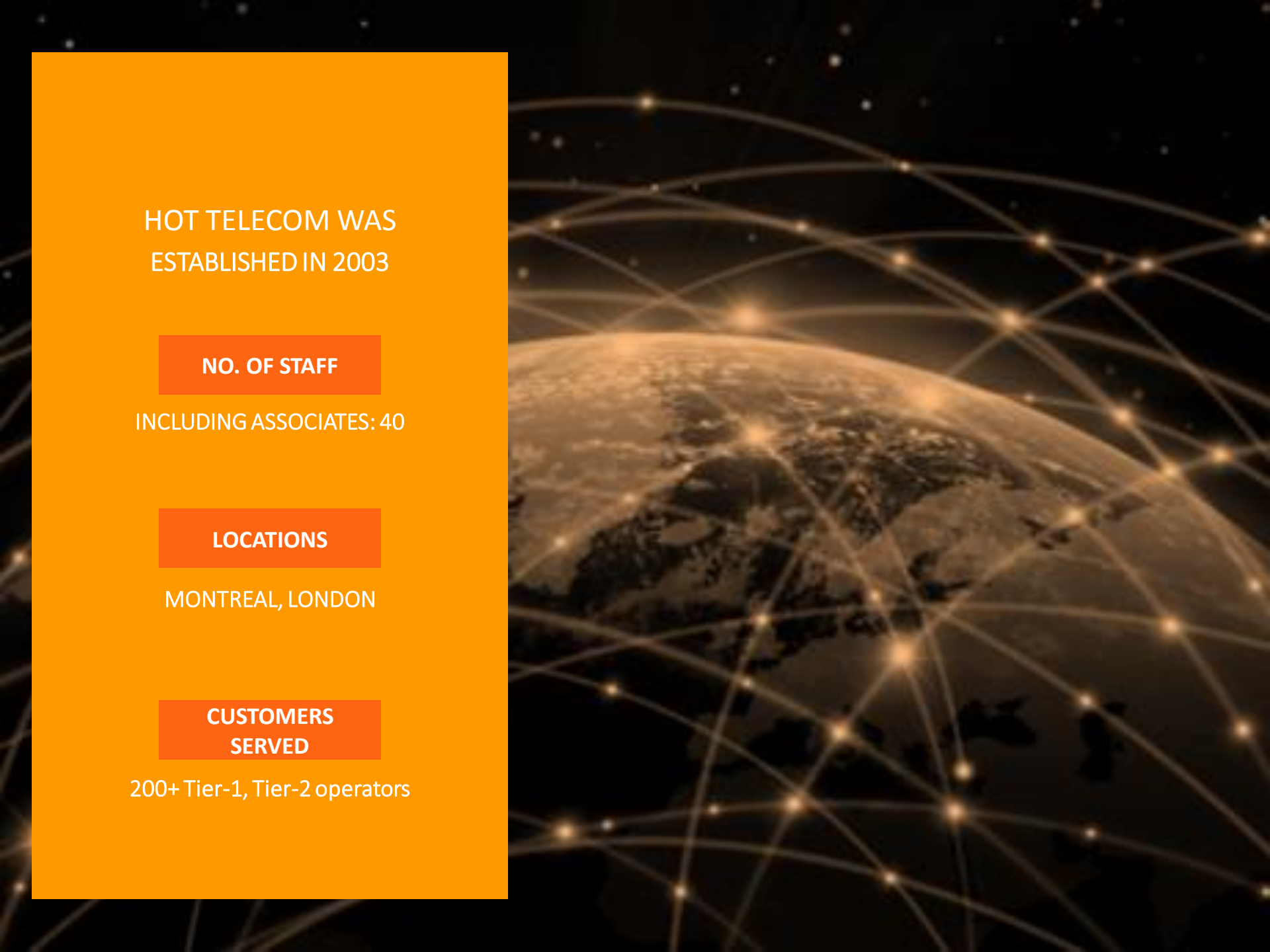
The

Future

THE FUTURE IS IP

Are you ready?

- ✓ **IP/IPX migration** - Where are we at
- ✓ **Services** - Where is the growth
- ✓ **Customers** - What do they expect and need
- ✓ **Adoption** - What are the drivers and inhibitors
- ✓ **Challenges** - What needs to be overcome
- ✓ **The Future** - What to expect



HOT TELECOM WAS
ESTABLISHED IN 2003

NO. OF STAFF

INCLUDING ASSOCIATES: 40

LOCATIONS

MONTREAL, LONDON

CUSTOMERS SERVED

200+ Tier-1, Tier-2 operators

HOT TELECOM'S IPX PORFOLIO
FROM START TO FINISH

RESEARCH AND ANALYLSIS

- ✓ IPX Market Revenue and Forecasts
- ✓ IPX – Who, what, where, when and how
- ✓ IPX – What customers expect and need

TRAINING WORKSHOP

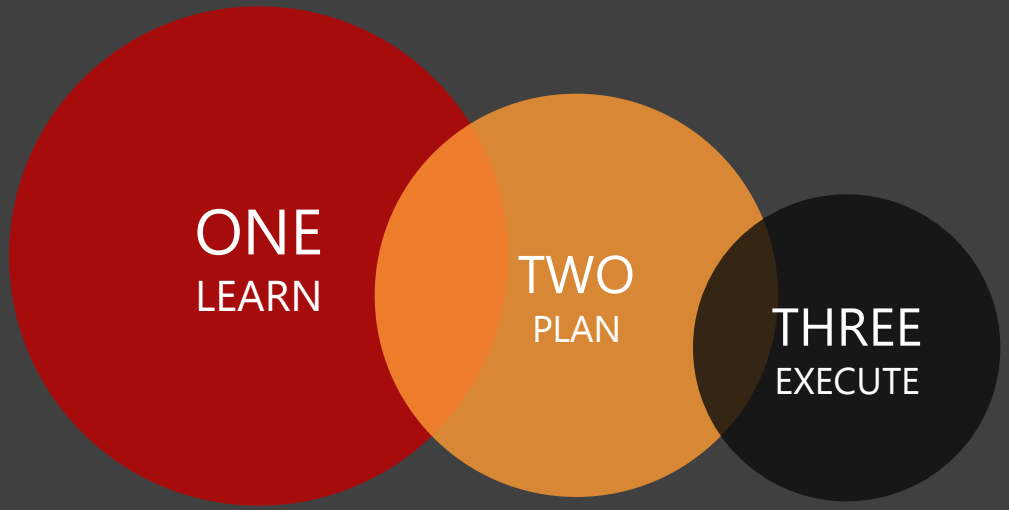
2-3 day flexible training sessions covering the main issues relating to IP evolution and IPX

STRATEGIC ENGAGEMENT

Strategic engagement to help you define your IPX migration strategy.

SUBJECT MATTER EXPERT (SME)

IPX subject matter experts working with you on to help deliver specific projects and deliverables.



KEY
FINDINGS

What IPX customers and providers have to say?

THE GREAT MIGRATION

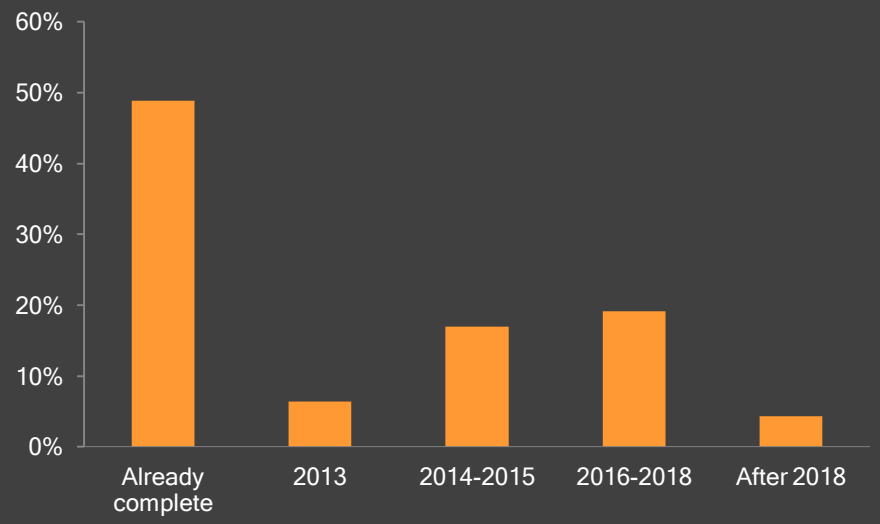
Crossing over to the dark side

IP MIGRATION
WHERE ARE WE AT?

INTERNAL NETWORK MIGRATION TO IP IS WELL UNDERWAY FOR MOST OPERATORS

- ✓ Close to 50% of the operators we interviewed had or were in the process of completing their internal backbone migration.
- ✓ Mobile operators were however lagging behind, compared with most other types of operators.
- ✓ Internal backbone IP migration should be completed for most operators by the end of 2018.

Q. What do you foresee as the timeframe for completing the migration of your internal network to IP?

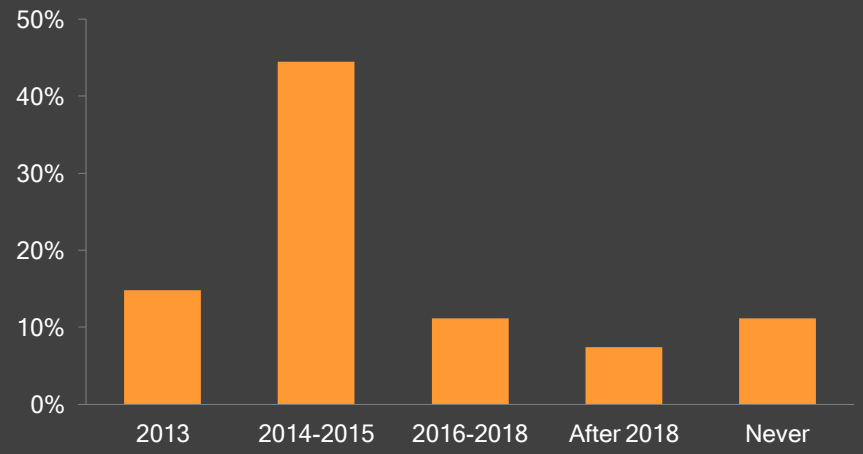


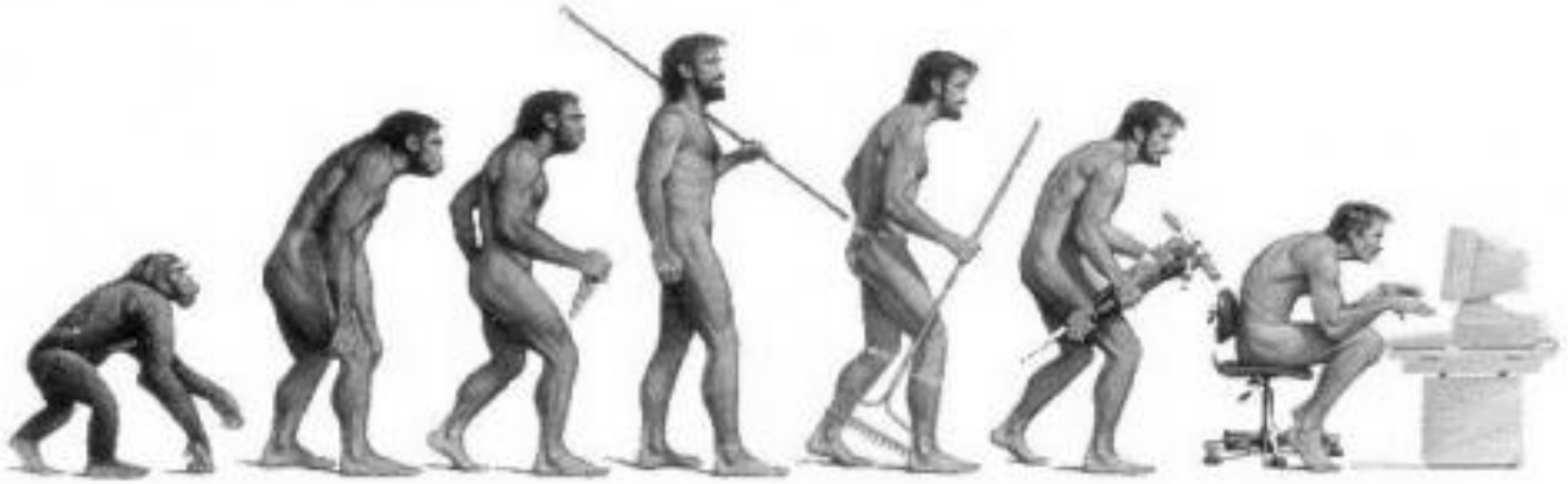
IPX ADOPTION
WHERE ARE WE AT?

IPX ADOPTION IS EXPECTED TO ACCELERATE IN 2014-2015

- ✓ Over 40% of customers we have interviewed stated that they are planning to adopt IPX for some of their services starting in 2014-2015.
- ✓ OTTs made up a large percentage of carriers with no plans to migrate to IPX.
- ✓ Mobile operators mentioned that their planned IPX adoption was directly related to the IP migration of interconnects between in-country networks and would follow it soon after.

Q. When are your planning to migrate some of your international interconnect services to an IPX?



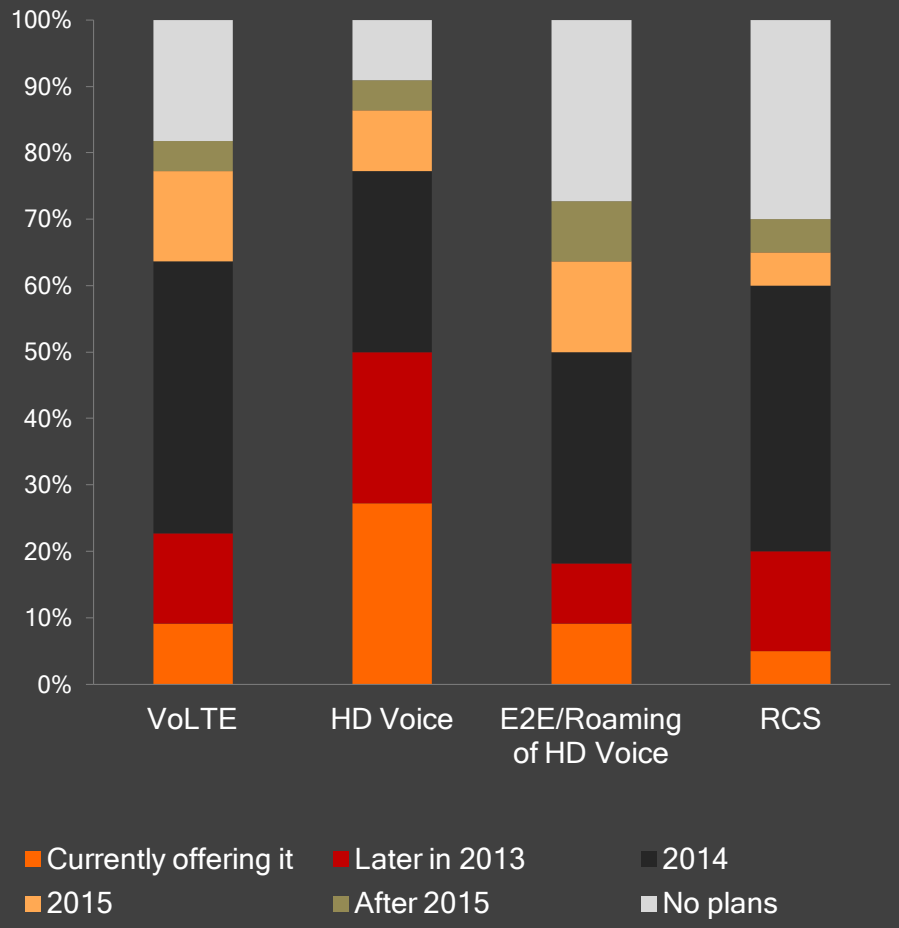


SERVICE EVOLUTION

We're in the midst of an evolution, not a revolution

SERVICES
HOW ARE THEY EVOLVING

Q. When do you plan offering these services?

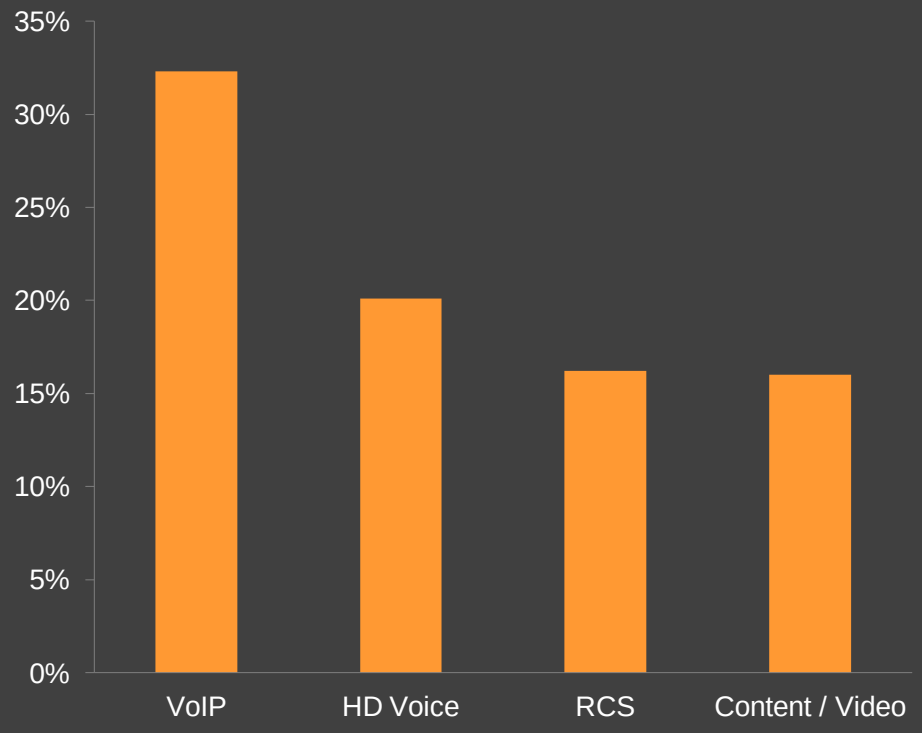


SERVICES EXPECTED TO TRIGGER DEMAND FOR IPX ARE BEING IMPLEMENTED AS WE SPEAK

- ✓ Over 70% of the operators we interviewed were planning to have launched HD voice services by 2015.
- ✓ VoLTE services are on most mobile operators' agenda starting in 2014.
- ✓ RCS is only starting to make its appearance into mobile operators' roadmaps partly to compete with OTTs.
- ✓ The facilitation of End-to-end HD Voice was identified by OTTs as a service of interest over IPX.

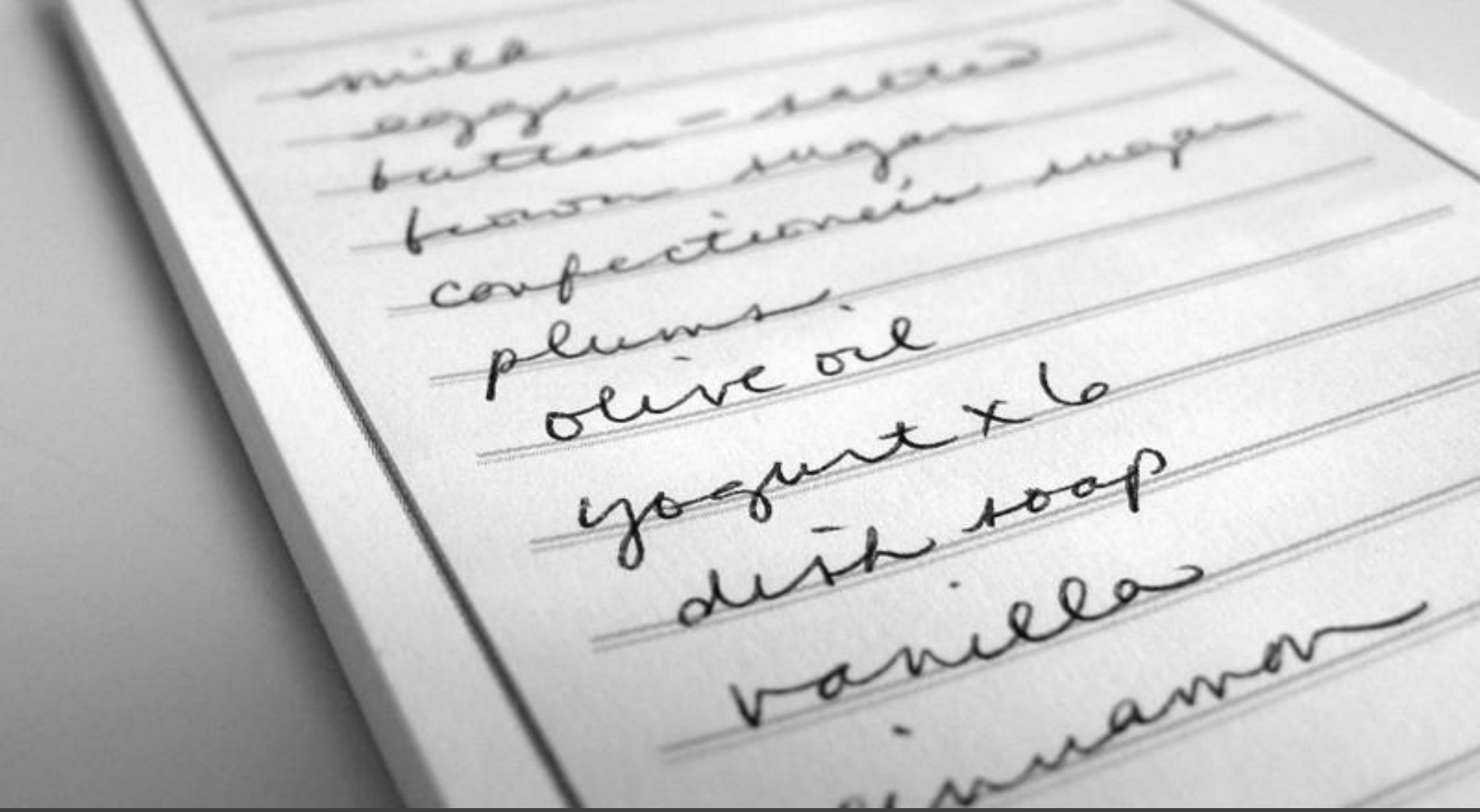
SERVICES
HOW ARE THEY EVOLVING

Q. Which retail services do you foresee offering over IPX in 3-4 years time?



VOICE IS STILL WHERE THE MONEY IS FOR NOW...

- ✓ The majority of the IPX customers are currently using the platform for voice and are expecting to continue to do so over the next 3-4 years.
- ✓ Over 50% of the survey respondents were expecting to use IPX to transport VoIP and HD Voice in 3-4 years
- ✓ While 16% said they expected to use it to transport video and content and 16% to transport Rich Communication services (RCS).



CUSTOMERS' WANTS AND NEEDS

Your wish is my command...

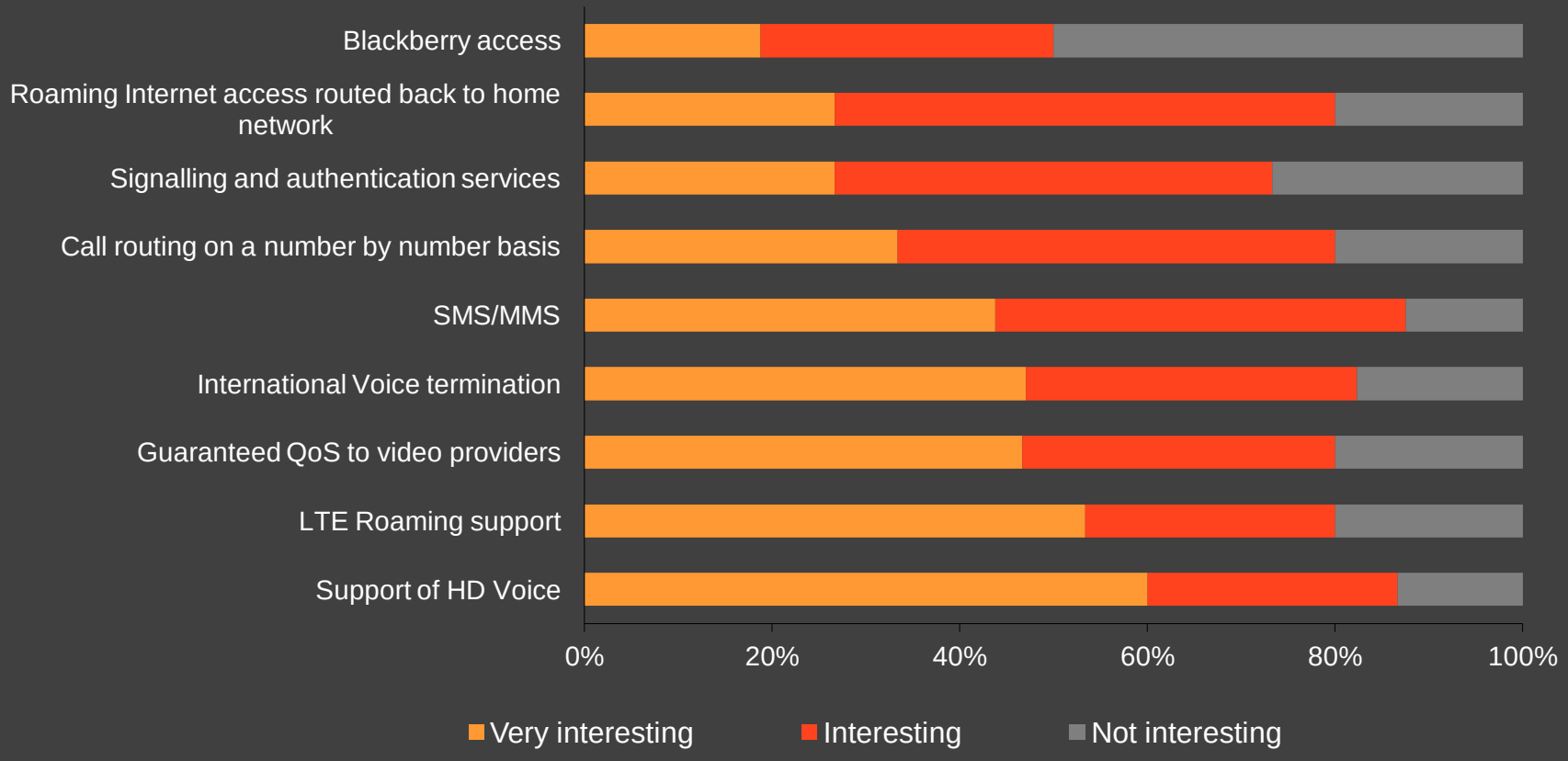
CUSTOMERS
WHAT DO THEY EXPECT AND NEED

The most important IPX features for service providers are:

- ✓Guaranteed capacity
- ✓Guaranteed quality
- ✓Multiple services over a single connection
- ✓Direct routing to their distant providers

CUSTOMERS
WHAT DO THEY EXPECT AND NEED

Q. Do you have any need for these services and features on IPX?



of the operators said that the most important factor when choosing an IPX provider is

global reach

IPX MIGRATION

What drives the leap

ADOPTION

WHAT ARE THE DRIVERS AND INHIBITORS

- Increased number of LTE network launches.
- Launch of HD Voice and HD Video Conferencing.
- Need to remain relevant in the evolving IP ecosystem
- Need to compete and partner with OTT players.
- Need to reduce the capacity required to terminate calls and increase margins.
- Long term CAPEX and OPEX savings as a result to the move to IP.
- Growth of voice over broadband.

ADOPTION

WHAT ARE THE DRIVERS AND INHIBITORS

- There is still confusion in the industry of what IPX is and its benefits
- Cost/benefit of migration still unclear for many.
- Service providers happy with the current quality of service at lower cost.
- Lack of IPX community scale with a limited number of destinations reachable via IPX.
- Desire to interconnect directly with their major traffic partners.
- Perceived risk in migrating existing well-working connections to a new IP platform.
- Slow migration of local and national networks to IP.
- Operators must continue to profit in some way from their legacy networks.

10 TOP CHALLENGES

READY FOR THE FIGHT

10 TOP CHALLENGES
WHAT NEEDS TO BE OVERCOME

1. High quality, premium services not required by all.
2. Continued lack of understanding of IPX services, features and benefits.
3. Time needed to migrate domestic networks to IP will delay take-up of IPX.
4. Complexity/cost of systems required to support new IPX business models.
5. IPX only one of many possible IP solutions.
6. Slow take-up of some key IP services: RCS, IMS.
7. Complexity of IPX peering agreements and technicalities.
8. Efficient routing under number portability rules.
9. High roaming charges inhibit the growth of mobile data traffic
10. Uncertain evolution of the IPX pricing model.

I know not what the future holds, but I know who holds the future

1. Services
2. Customers
3. Business Model

SERVICES

What's The Future

- ✓ VoIPX generates the largest part of IPX revenue and should continue to do so for some time to come.
- ✓ LTE is seen as one of the main triggers for IPX migration and most IPX providers are in the trial phase to support LTE roaming, signalling and VoLTE.
- ✓ Significant traction for IPX will come for the push of HD services.
- ✓ Possible opportunities in the future with following services:
    - Ecommerce and mobile payments
    - Cloud services with SLAs
    - IP-VPN

CUSTOMERS

What's The Future

- ✓ Mobile service providers are expected to remain the main IPX target market over the next 3-4 years.
- ✓ The majority of service providers considering IPX are planning to migrate part of their service to IPX in 2014-2015.
- ✓ The majority of MNOs are planning to offer VoLTE, RCS services and end-to-end roaming HD Voice starting in 2014.
- ✓ A significant portion of IPX customers say that they are already offering HD Voice services or that they will start doing so by the end of 2013.
- ✓ Service providers in Asia are adopting IPX much more rapidly than operators in other regions.

BUSINESS MODELS

What's The Future

- ✓ IPX peering is a growing trend and IPX customers are eager for peering agreements to be concluded to rapidly increase the number of IPX destinations.
- ✓ Consolidation of the International wholesale market could be triggered by IPX Hubbing.
- ✓ Service providers are expected to migrate their smaller routes to IPX hubs, while continuing to control their major routes directly.
- ✓ Expected model: A handful of global IPX hubs with a number of regional IPX providers.
- ✓ Per minute billing for voice could evolve to a capacity based billing down the line.

‘The best way to predict the future is to create it.’

Peter Drucker

MORE DETAILED IPX INFORMATION

IPX Market Revenue and Forecasts
http://www.hottelecom.com/reports/ipx-revenue-analysis.html

IPX – Who, what, where, when and how
http://www.hottelecom.com/reports/ipx-traffic-analysis.html

IPX – What customers expect and need
(To be published by the end of May 2013)

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HOT TELECOM
THE IPX EXPERT

The Future of Industry Panel Discussion

Panelists:

Carlos Da Silva, Director, Product Business Development, PCCW Global

Vincent Hebbelynck, Head of Voice Development and Innovation, BICS

Andreas Mann, Commercial Manager, Vodafone

Christian Michaud , Senior Vice President, Product & Business Strategy, Global Voice Solutions, Tata Communications

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The Future of Industry

Panel Discussion

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Philippe Millet

i3 Forum Chairman

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