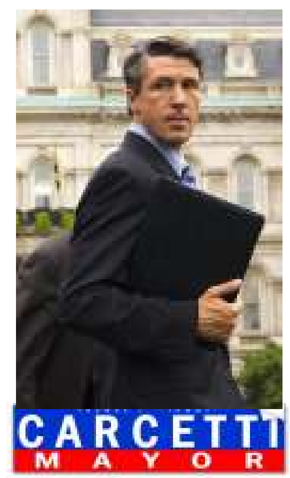
Mobile Internet:

From CFP & PBB to NGMN & LTE/SAE

A personal journey through the maze of telecommunication industry



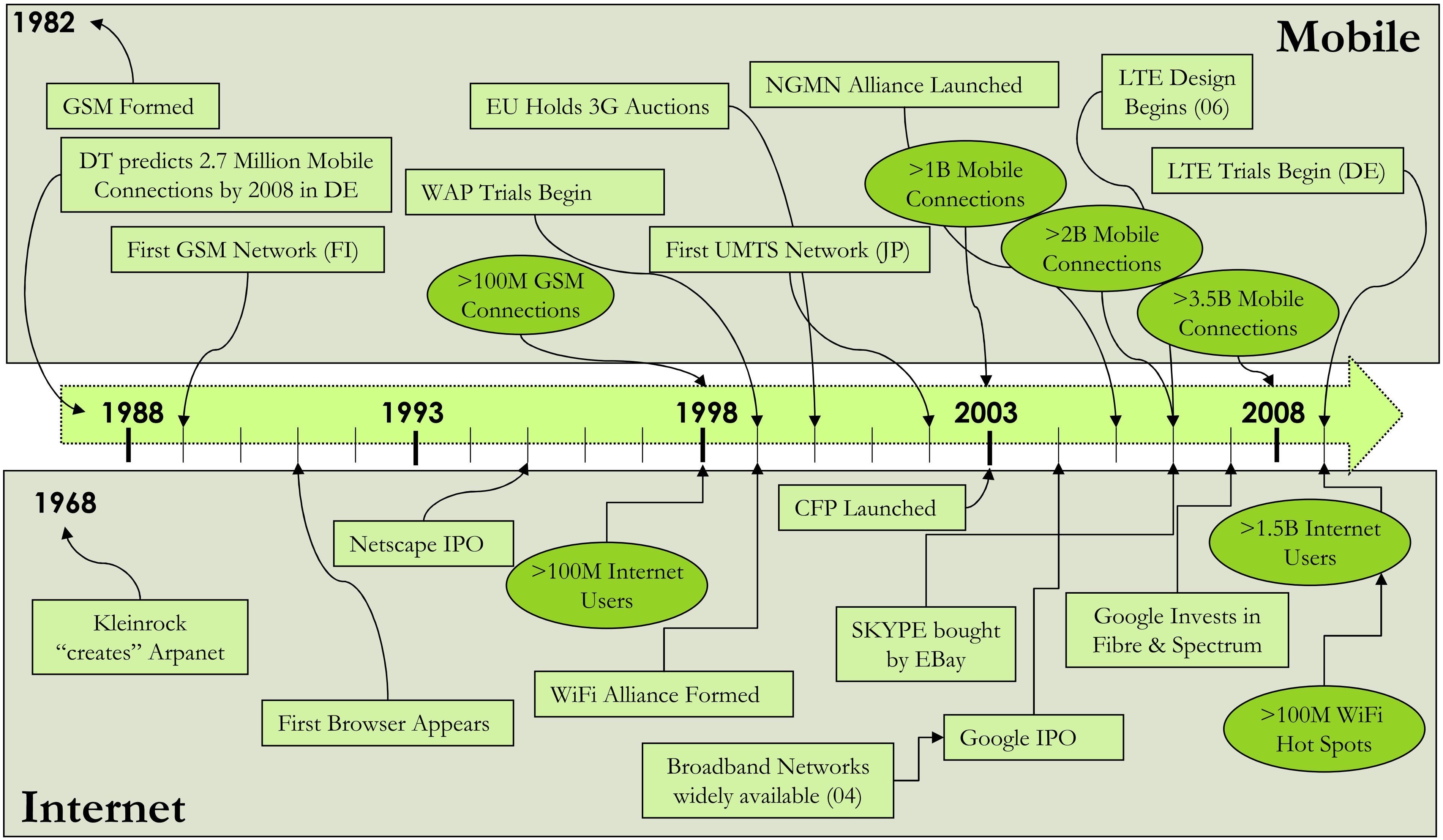
Hossein Moiin

Mobility Fellow, BT &

Former Chairman of NGMN EWG

Selective Historical Context

Mobile Internet



Key Trends

Ecosystem View

1 Digitisation

ALL IP / ALL Digital

2 Socially Conscious

Global Communications & Local Actions + Green Policies

3 Individuality

My Tech NOT Hi Tech choice & the "long-tail"

4 Mobility

Any where, Any time, Any Device

5 Broadband

Growth of Bandwidth Hungry & Near Real-Time Apps + Access as a Right Policies

6 Liberal Regulations

Spectrum & Competition: Technology Neutrality

7 Competition

Inter & Intra Industry Competitors

8 Confluence

Changes occurring due to multiple effects

9 Shorter Clock Speeds

Advantages are no longer structural; Ever improving technology

10 Flexibility

The key attribute for success: Liquid Not Solid

11 Platforms

Applications win battles, Platforms win wars

12 Macro Economics

Dark days ahead?

Observation

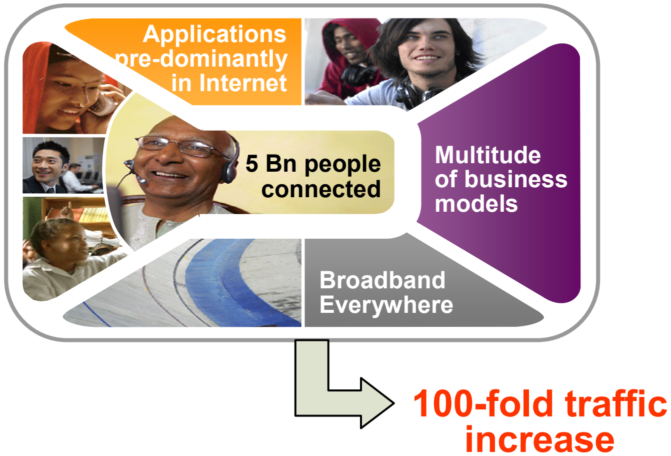
Role of Service Providers

- 2003: Voice/Messaging moving to mobiles, why?
  - Convenience?
  - Personalisation?
- Can other services be far behind?
- What is needed?
  - Better Access?
  - Better Services?
  - Business Models?
  - Intelligence?
- Moving broadband connectivity from fixed locations to mobile individuals?

Telecommunication Futures

Personal Broadband: User/Service Centricity

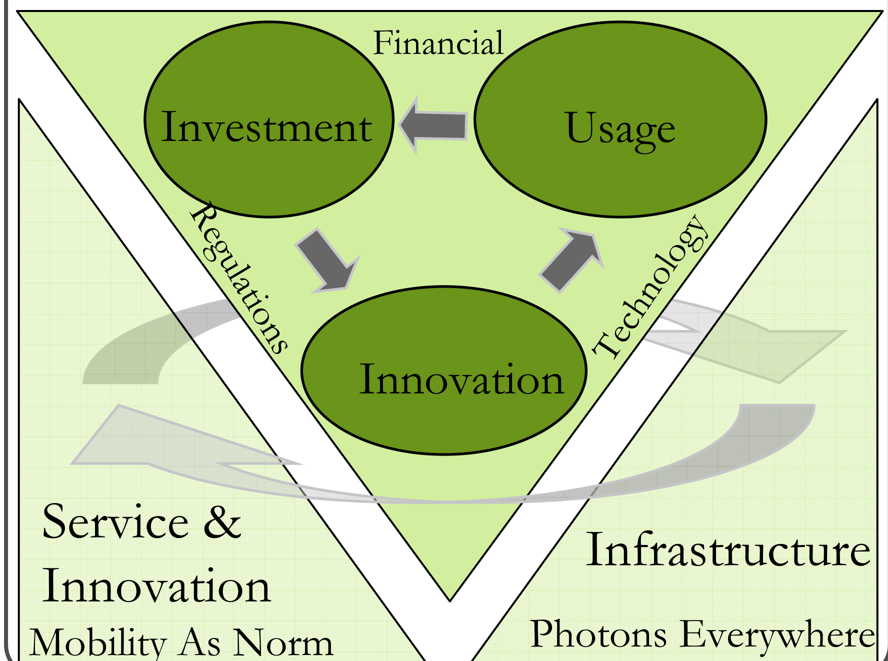
Context: A Plausible Future?



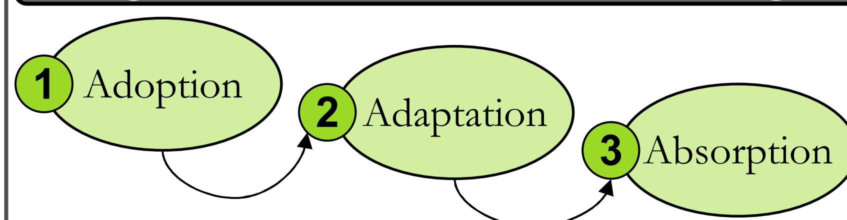
Technology & Service

- A copper-less word: Fiber & RF Radio as core technologies
- Wireless @ the edge: Mobility as the norm
- UI-Centric: No killer applications, but a killer user experience
- Open and standardised
- Internet ++: Semantically Intelligent, Dependable (QoS, Secure) & Mobile

Business



Usage Process of Successful Technologies



Lessons From Confluence & CFP

Education is Never Wasted!

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1 Product Development

Historical Models & Core Assumptions:

1. Push (Corporate R&D, DRAPA/NSF/EU, Academia, individuals, etc)
2. Pull (Market Research, Customer Feedback, etc)

Plausible New Avenue? → "Near enough is good enough"

Collaborative, Incremental & User Led: Web 2.0, "Long Tail", Semantic Web & Permanent Beta?

2 Infrastructure

Historical Models & Core Assumptions:

Infrastructure is an expensive entity to be built only once, and requires a "long-time" to recover the initial investment. Often a monopoly & top-down → Industrial Information Production

Plausible New Avenue? → Femto Cells & Hubs

Easily replaced and upgraded through bottom-up & collaborative ownership: Network Information Production & Community Networks; Spectrum Abundance NOT Scarcity

3 Architecture

Historical Models & Core Assumptions:

Optimised for a specific service (or collection of services) leading to stove-pipes with well defined rigid structures (solid)

Plausible New Avenue? →"Flat, leave it to apps & devices"

Generic, non-optimised, adaptable to solve various problems (liquid)

4 Business Models

Historical Models & Core Assumptions:

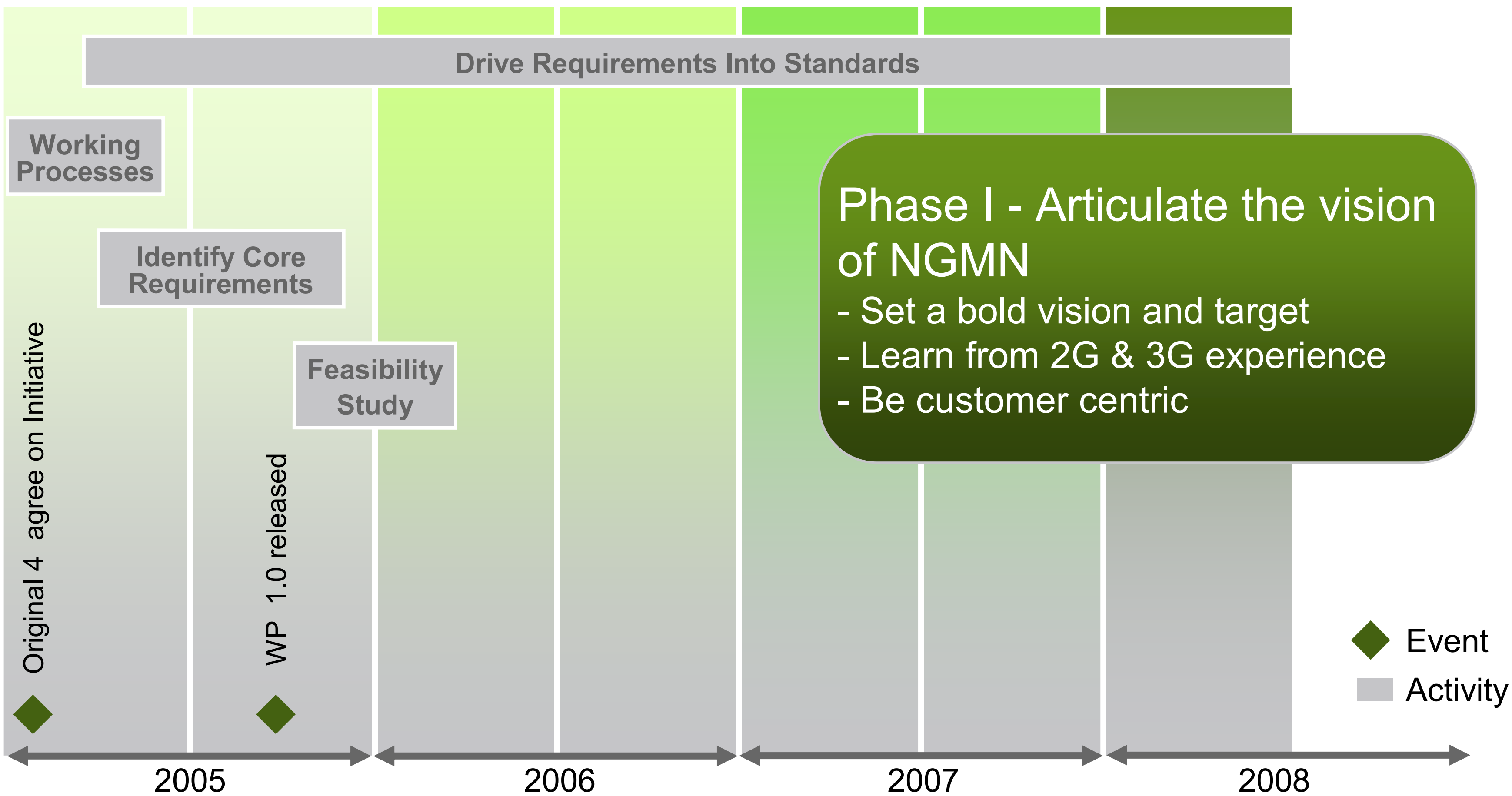
Own customers, services or products and match them to one another to maximise some economic measure (profit, revenue, etc)

Plausible New Avenue? → Partners & Enablers

Users instead of customers
Services & products user defined
Minimal cost, no ownership (customers/services)

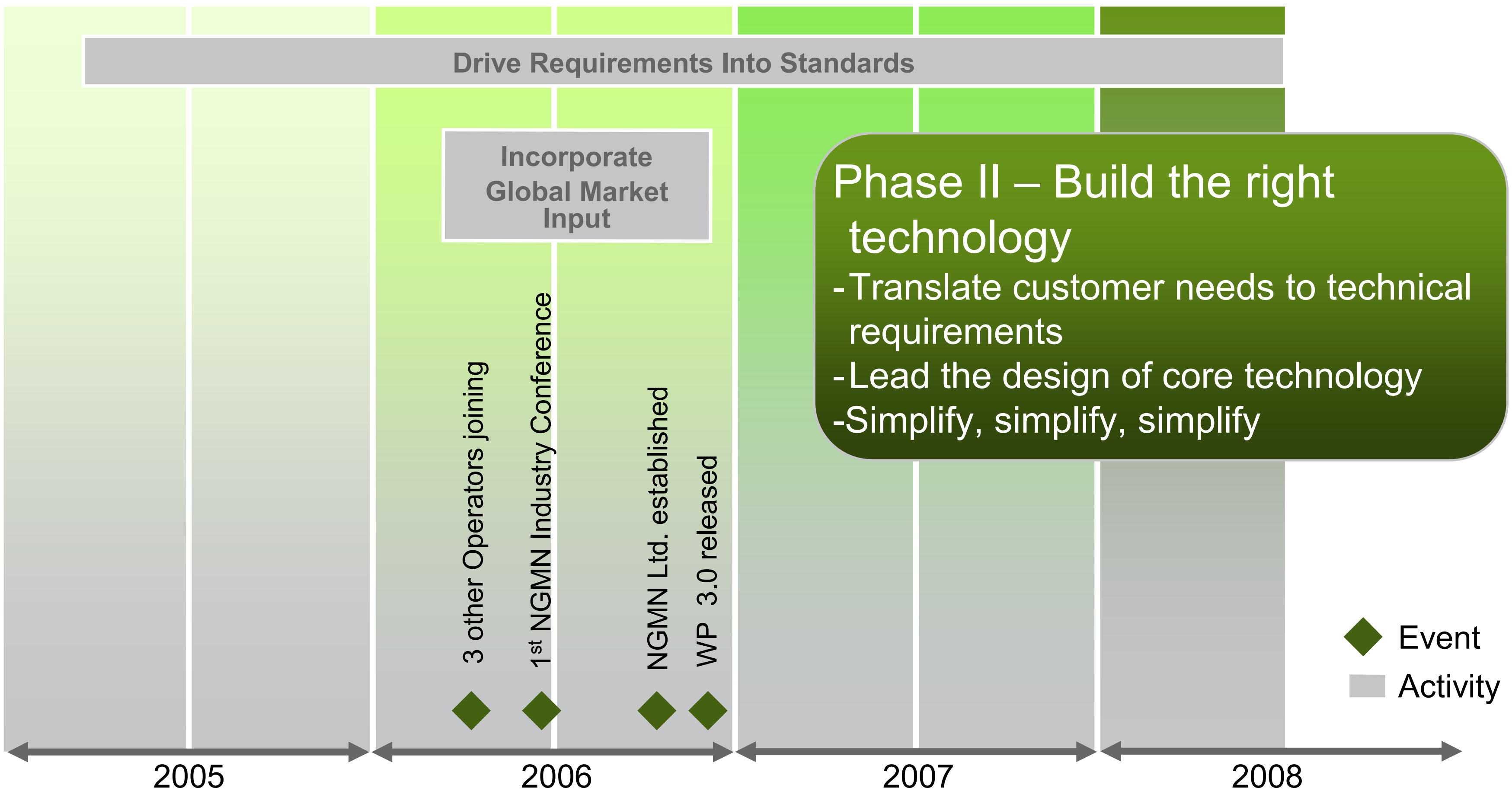
History of the NGMN Alliance

Realising a Bold Vision: PBB @ a difficult Time



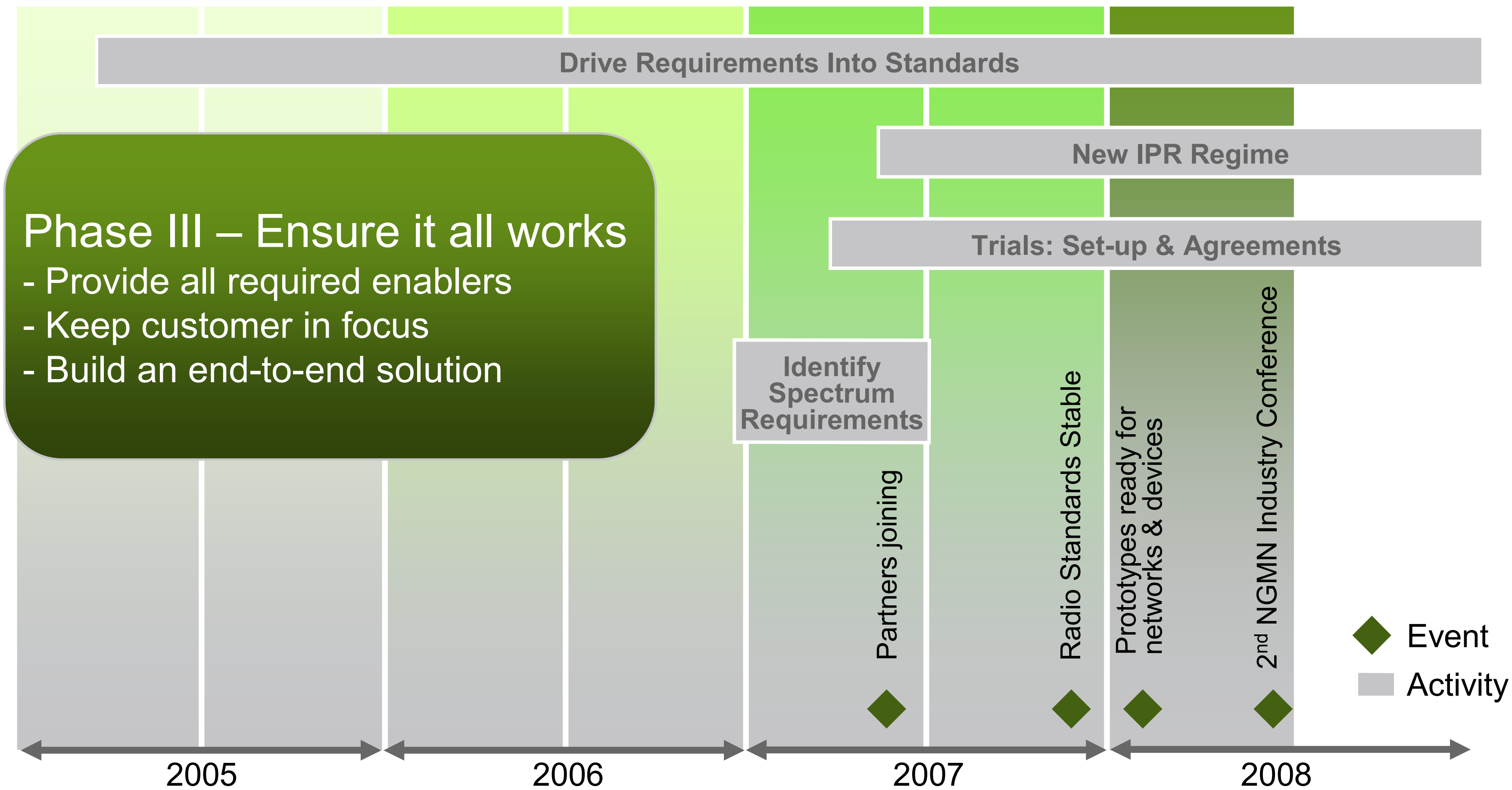
History of the NGMN Alliance

Things Get Worse Before They Get Better!



History of the NGMN Alliance

Nearly There!



Organisation of the NGMN Alliance

The Role of NGMN Alliance

Members*: 19 worldwide leading mobile operators

Sponsors*: 29 worldwide leading technology vendors

Advisors*: 3 universities / research institutes

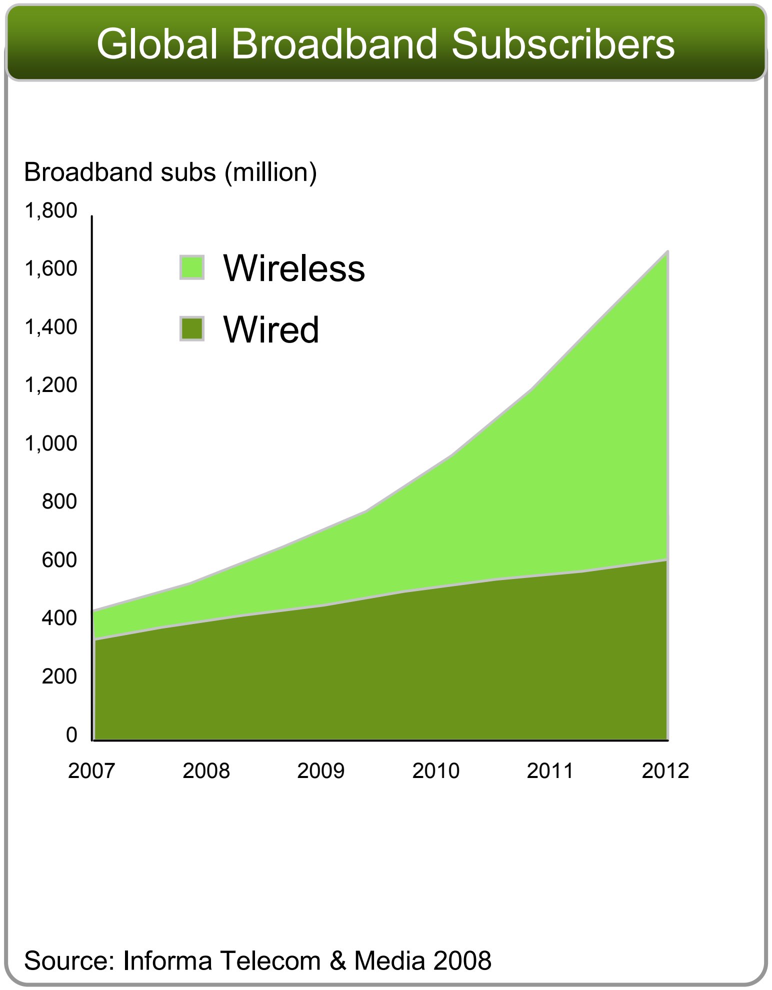
Working Groups

- Ecosystem
- Spectrum
- IPR
- Technology
  - Networks
  - Devices
- Trials
  - Technology
  - Customers

* As of June 2008

Market Development of Mobile Broadband

Growth - Shape of Things to Come



Both supply and demand drive the mass market adoption of mobile broadband:

- Personalised, easy-to-use plug & play devices
- Advanced networks
- Increased competition
- Desirable applications
- Improved coverage
- Worry free pricing

Mobile broadband expands the addressable market by:

- Supporting high bandwidth multimedia applications
- Incorporating consumer electronic devices into the mobile networks

Future Customers: UK

Speed or Mobility?

	Mobile BB data rate
DL	<7.2Mbps Max (~1Mbps realistic)
UL	<5.7Mbps Max (~500kbps realistic)

	Fixed BB data rate
DL	<8 Mbps Max
UL	<800 kbps Max

Fixed Factor

BB from £15.65 per month

(10GB max. monthly usage)

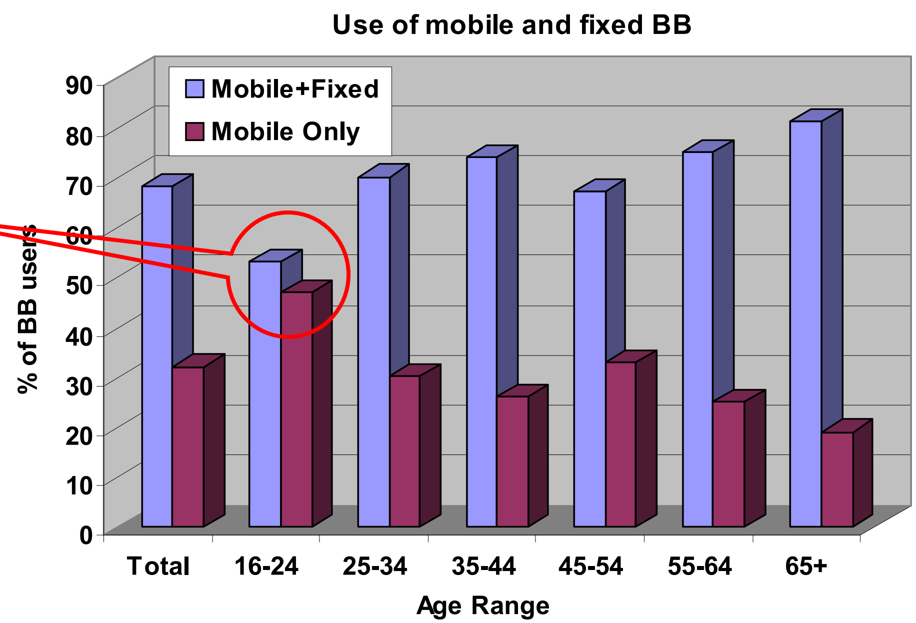
+ £10.27 month line rental

Mobility Factor

From £10 month

(3GB limit monthly usage)

This group will become a greater proportion of future customers



Source: The Communications Market 2008, Ofcom

Success Criteria for Mobile Broadband

A Thriving Ecosystem

1. Extend breadth of services
2. Expand partner and market opportunities
3. Enrich user experience
4. Expedite deployment of new apps & iteration cycles

→ Services Apps & Devices

5. Reduce complexity, cost and risk

→ Networks

6 Key Challenges To Overcome

Money, Usage & Innovation

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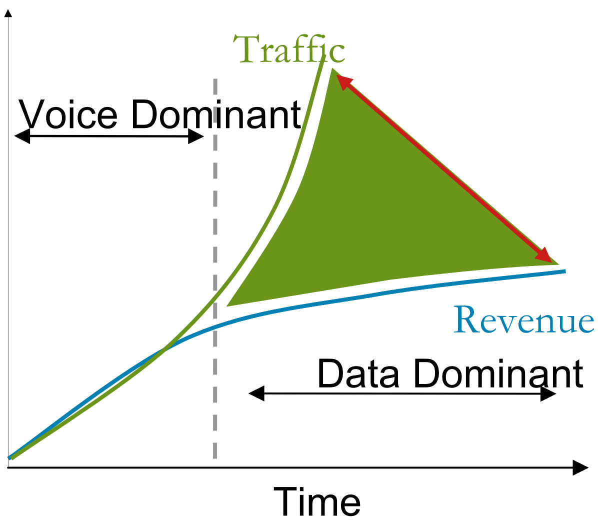
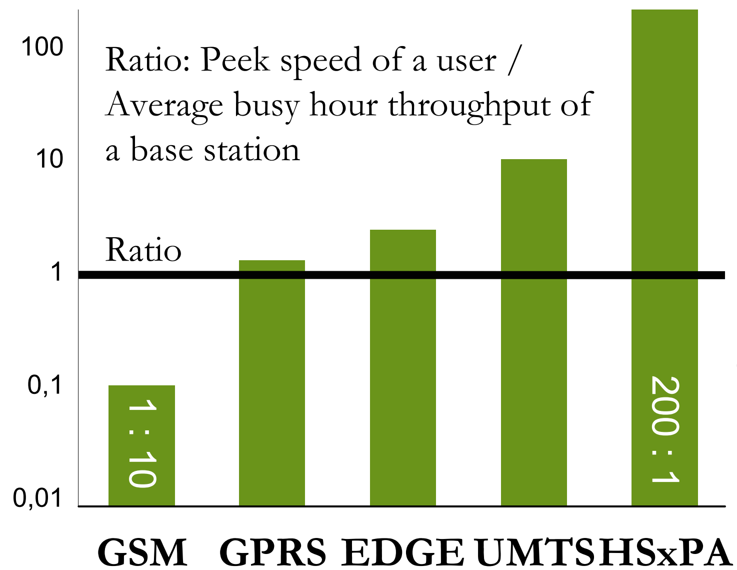
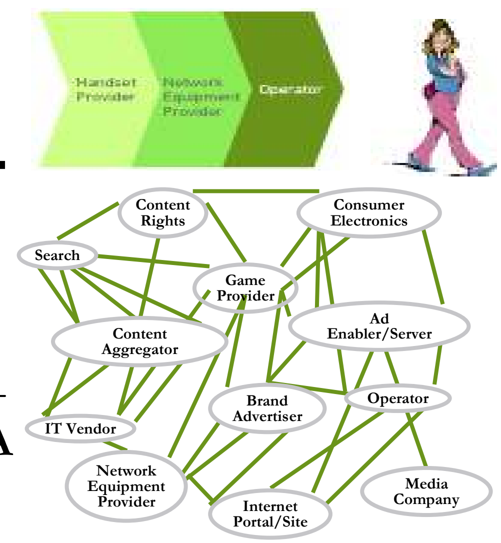
1 Economic Viability



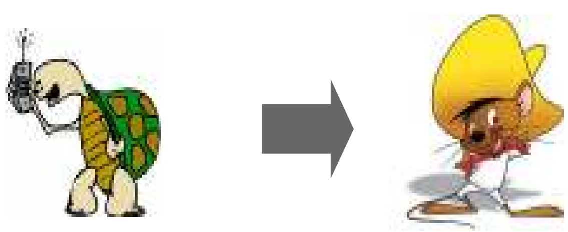
2 Transmission Challenge



3 Value Chain Restructuring Challenge

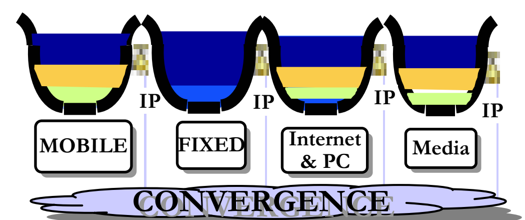


4 Character Challenge



5 Technology Challenge: Lowering of barriers → Moving towards a flat architecture

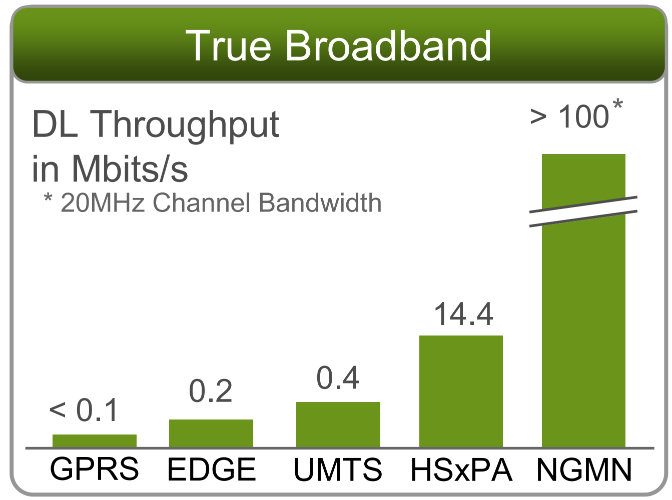
6 Convergence

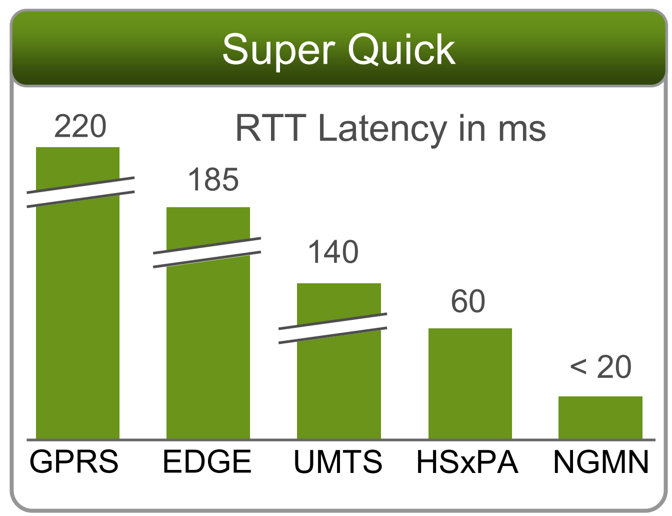


Key Deliverables of the NGMN Alliance

Enhanced User Experience

- Improved throughput (DL & UL) with impact on services such as access to email
- Always on
- Improved latency with impact on interactive services such as browsing

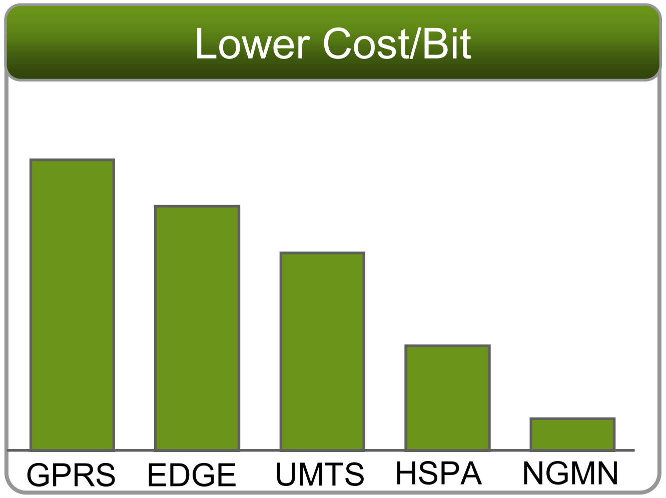




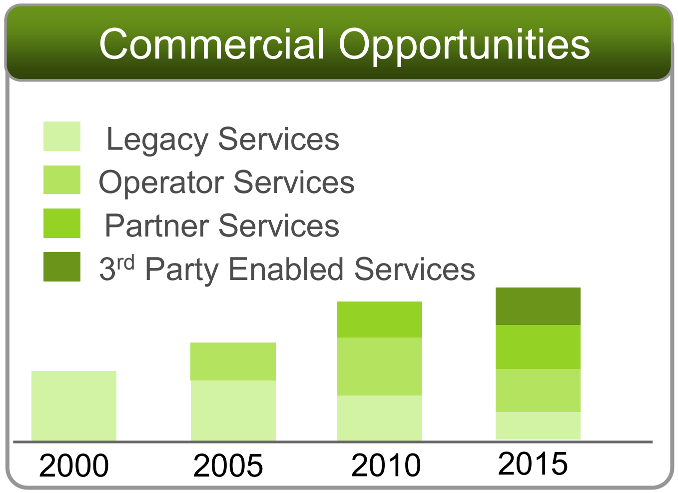
Key Deliverables of the NGMN Alliance

Viable Economics

- Lower cost / bit due to:
  - Simplified architecture
  - Improved spectral efficiency
  - Reuse of existing assets

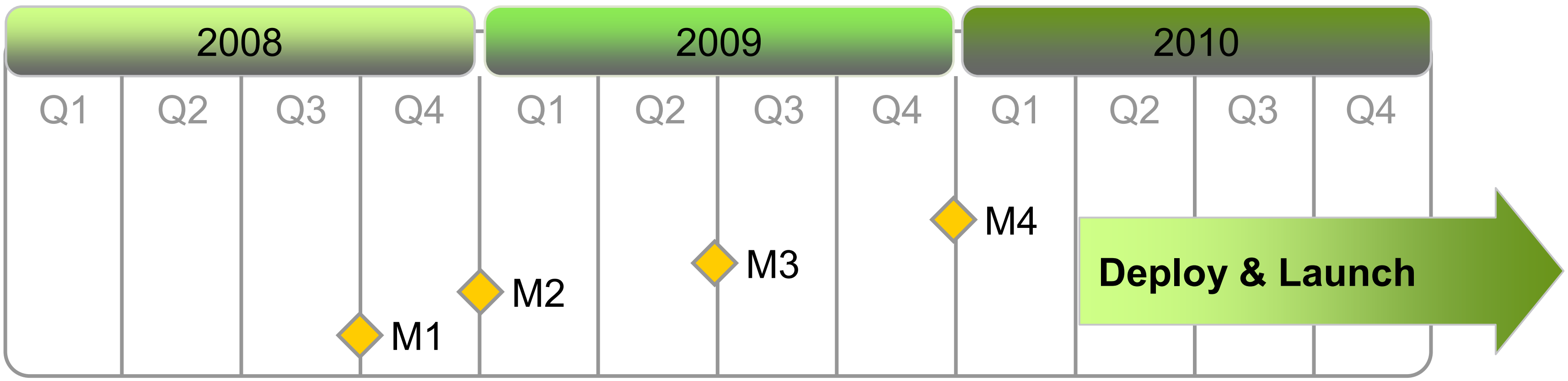


- Expand commercial opportunities:
  - Existing services
  - New services



Roadmap to Success

Key Milestones for the NGMN Alliance



- M1: NGMN Technology Evaluation & Recommendation; Trails of basic functionality starts
- M2: Standards (and IPR regime) finalised (1st Release)
- M3: Infrastructure & Terminals ready for IOT; Start of friendly user trials
- M4: Infrastructure & Terminal IOT completed