Synchronization and small cells

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Agenda

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- Small cells and the Small Cell Forum
- SCF Release Plan
  - R2 Enterprise Focus (preview)
- Synchronization and small cells
- Q&A

Motivations for Small Cells

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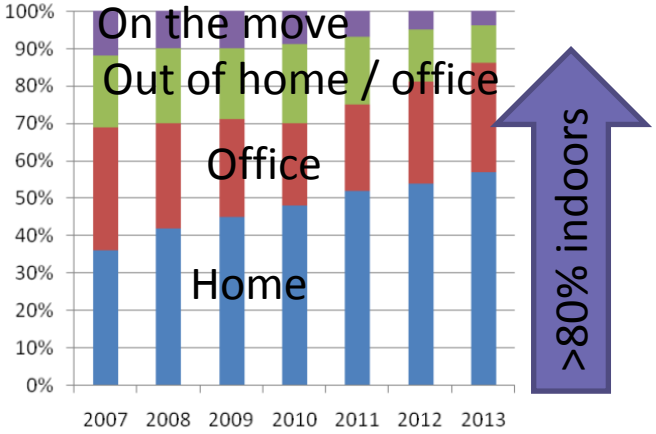
- **Consumers increasingly sensitive to coverage**
- **Dramatic growth in mobile broadband**
- **Operators need to meet demand quickly and at reduced cost-per-bit**

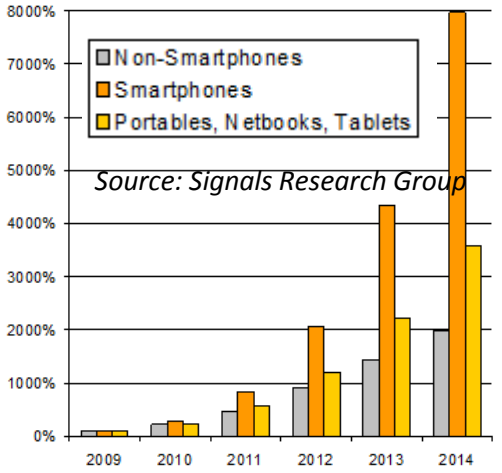
Traffic increasingly indoors



Source: Informa

Explosion of internet connected devices

Exponential growth of mobile data traffic



Source: Signals Research Group

Benefits of small cells

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Rapid growth in deployments, due to advantages of small cells

Key benefits include:

- **Improved coverage**
- **Greater capacity**
- **Spectrum efficiency**
- **New applications**

- These benefits apply equally in the **home** (femtocells), **office** (enterprise) or **outside** environments (metro, rural)
- Devices remain under control of licensed network operators and operate within their own spectrum

The Small Cell Forum

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To accelerate small cell adoption to change the shape of mobile networks and maximise the potential of the mobile internet

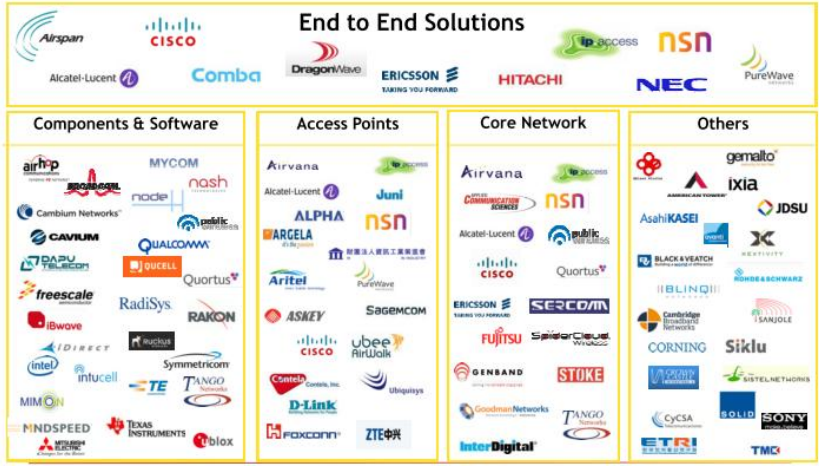
Not-for-profit, founded in 2007

Independent, Inclusive, International

Aims

- **Ecosystem Development**
- **Market Education**
- **Driving open standards**

67 operators covering 3 billion mobile subscribers – 44% of total



83 providers of small cell technology representing all parts of the ecosystem

FY 2013 Summary

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150 members | **25** new members

20,000 Release Programme downloads

110% increase in online traffic

50,000 **NEW** visitors to smallcellforum.org

12,000 visitors to Release site scf.io

2000+ Twitter followers

2000+ LinkedIn group members

1st LTE plugfest

98% of operators say small cells are important

2 new working groups
Backhaul and Deployment

Small Cell Forum Groups

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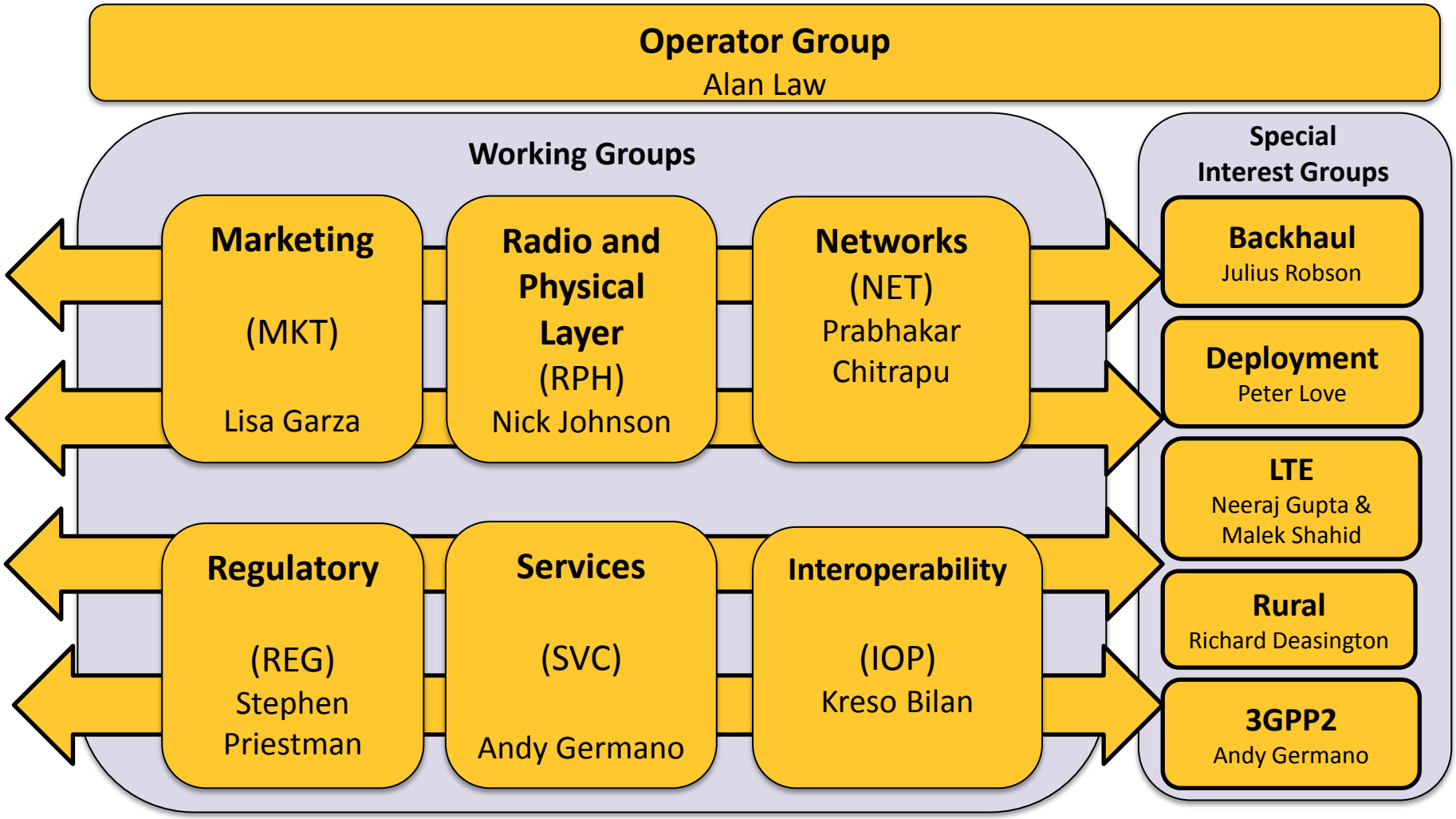

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- SCF work given structure & direction by **Release Programme**
- Goal: to accelerate small cell adoption across all major use cases.
- Publish new releases when significant body of work completed.
- This serves as the theme for the Release.

Our Release Programme: how it works

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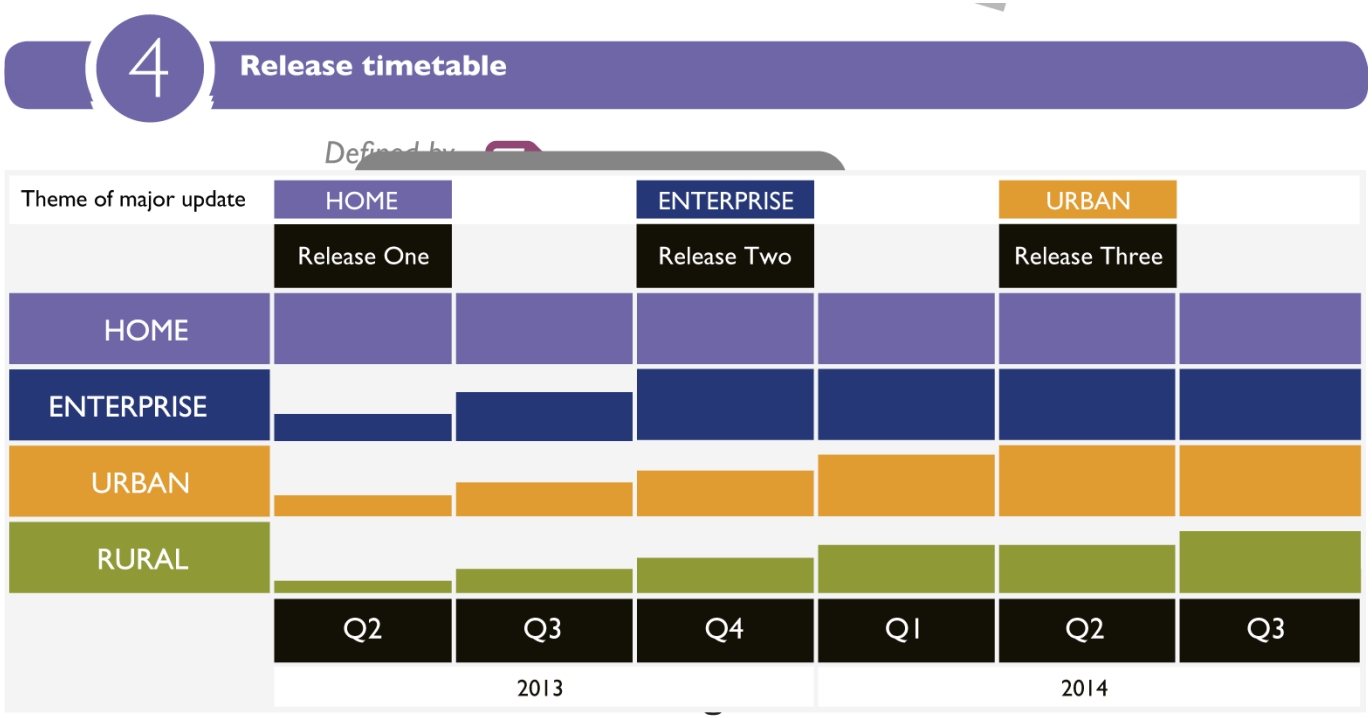
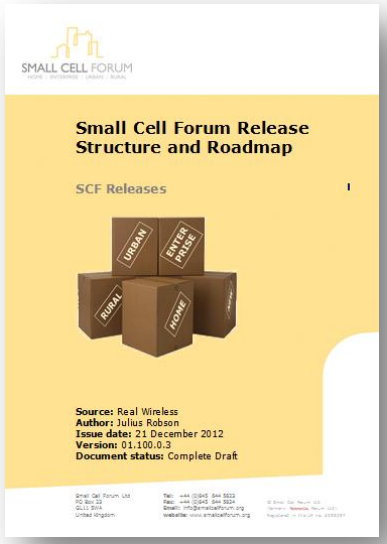
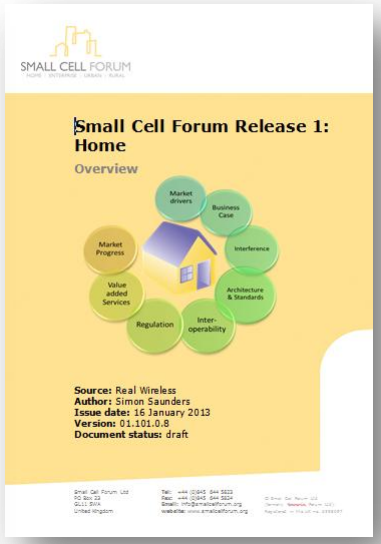
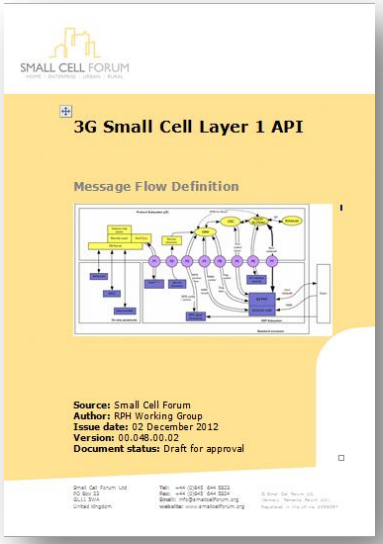


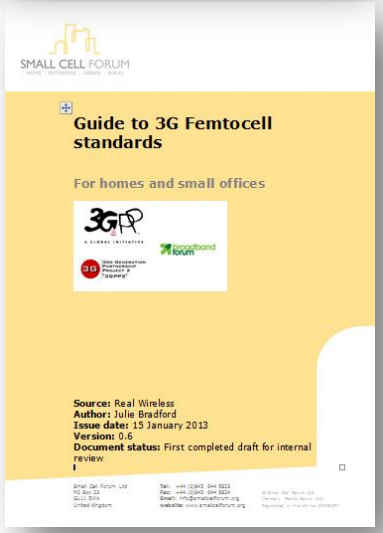
Presenting Small Cell Forum Release 1

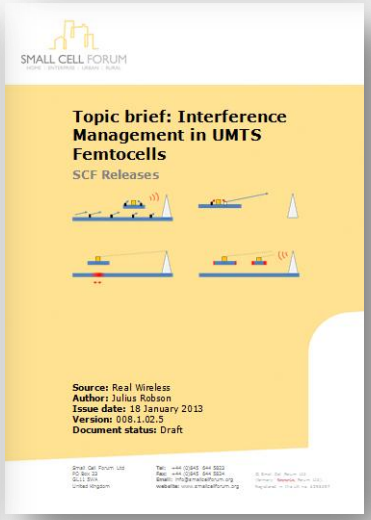
Six new or rewritten documents…

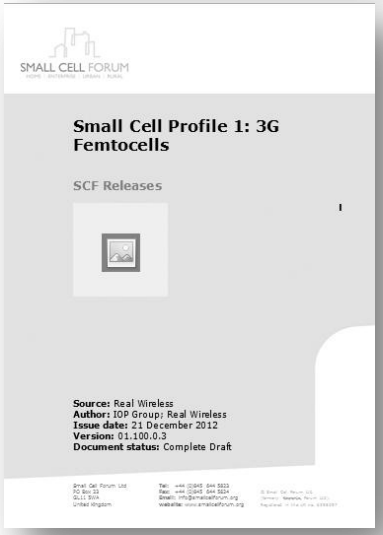












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…plus 15 republished with varying levels of update

What does the current release plan look like ?

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SCF Release 1: Home provides an 'all you need to know' guide to the commercial deployment of 3G femtocells.

It is aimed at operators that have waited to deploy until the market and technology were proven.

Encompasses: market drivers, business case, key technology information including standards, operator lessons, regulatory information and a profile of recommended equipment specifications that can be requested in RFPs.

- Releases publicly available on bespoke website.

Up to the minute Backhaul and Rural Whitepapers included

Enterprise, Metro and Rural guidance provided in terms of:

- Operator requirements
- Evolving standards
- Early deployments

Enterprise Situation

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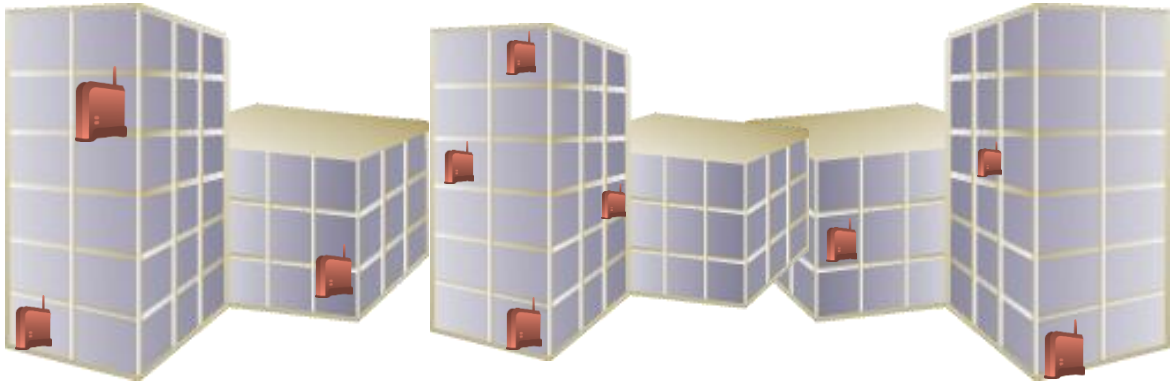
- 39%-61% of offices have noticeably poor in-building coverage[1]
- Yet over 80% of total mobile data traffic is indoors[2]
- Serving in-building traffic from outdoors places a heavy load on operator spectrum, reducing potential efficiency[3]
- DAS plays a useful role in public buildings and the very largest offices, but costs are often prohibitive for smaller Enterprises - which are in the majority



1 YouGov research, Feb 2013, figures for UK and US respectively
2 Paolini M. "Mobile data moves indoors", September 2011
3 Signals Research Group: "Valuable Licensed Spectrum is a Largely Under-Utilized Asset Indoors", Feb 2013

Key Drivers

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For Enterprises:

- Essential coverage that addresses their business needs
- Opportunity for value-added services

For Operators:

- Can deploy small cells quickly and easily at relatively low cost
- Establish good relationship by providing services in demand
- Huge opportunity for those who move quickly to gain market share

For Small Cell Vendors:

- High quality voice is table stakes
- Opportunity for value-added data services

Release Two Enterprise : Key findings

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- In building mobile voice coverage is variable
  - 39%-61% of offices have noticeably poor in-building coverage[1]
- In the past, Enterprises have accepted this…
  - ... but now are now less willing to do so
- Ubiquitous high-quality voice increasingly seen as <u>essential</u>
- Enterprises are demanding coverage & will switch service providers
  - 87%[2] of businesses would switch from their existing service provider to guarantee coverage
  - 72%[2] of businesses are interested in small cells to improve cellular performance

1 YouGov research, Feb 2013, figures for UK and US respectively
2 Alcatel Lucent, Feb 2013

Summary

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- The advent of Enterprise small cells builds on the established technology, standards and learnings of residential femtocells
- Operators can provide solutions to Enterprises which were previously not accessible at a reasonable cost
- Enterprises are demanding solutions, and agile Operators who provide such solutions can produce massive benefits in satisfying their customers
- Independent studies show a good business case for both the enterprise and the operator, provided the deployment approach is tailored to enterprise needs
- Small Cell Forum's Release 2 will provide an 'all you need to know' guide on how to achieve these benefits

Synchronization and small cells

- Synchronization : essential topic across small cell types, thus not tied to release program
- Existing document focuses on 3G Small Cell Sync
  http://scf.io/en/documents/036_Femtocell_synchronisation_and_location_topic_brief.php

- New document focuses on Sync for LTE Small Cells
- Release Target : Next Plenary in Dallas, in December

Document: 075 Sync for LTE Small Cells
Extranet Folder: http://extranet.scf.io/filemanager/folder/1809

LTE Small Cells – Sync WP
Executive Summary

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- Section 1 :
  - Requirements, various types of radio, including LTE and LTE-A.
  - Implication of cell location on level and type of synchronisation
- Section 2 :
  - Different types of small cell deployments
  - Identifies which LTE and LTE-A features each are likely to use.
  - Summarises level and type of synchronisation for each.
- Sections 3 and 4 :
  - Techniques to synchronise, advantages and disadvantages.
    - Precision Time Protocol (PTP), Network Time Protocol (NTP)
    - Synchronous Ethernet (SyncE), Cellular Network Listening
    - Global Navigation Satellite Systems (GNSS)
    - PTP/NTP combined with Assisted GNSS
    - Cellular Network Listening combined with Assisted GNSS
    - SyncE combined with Assisted GNSS, PTP combined with SyncE

LTE Small Cells – Sync WP
Executive Summary

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- Section 5 :
  - Synchronisation capabilities of different backhaul technologies
  - How they affect the choices for small cell synchronisation
- Section 6 :
  - Impact on service caused by degraded or lost synchronisation.
- Section 7 :
  - Deployment use cases for synchronization delivery by either the mobile operator or the backhaul provider.
- Section 8 :
  - Network maintenance and troubleshooting in case service issues and impact described in Section 6 are experienced.
  - describes solutions for synchronization monitoring and assurance.

How to get involved:

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Be part of Release Two & Three – Enterprise and Urban

Join us at our international plenaries

Become a marketing ambassador

Contribute blog posts and follow us!

Join us at major industry events for speaking and exhibiting opportunities

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small cell hub

GSMA MOBILE WORLD CONGRESS

AVREN'S SMALL CELLS WORLD SUMMIT

Upcoming Events

- Small Cells Americas – Dallas, Texas USA December 3-6, 2013
- Mobile World Congress, Barcelona, February, 2014
- Small Cells Asia – Bangkok, Thailand April, 2014
- Small Cell World Summit – London UK, June 2014

We welcome your membership & participation!!!

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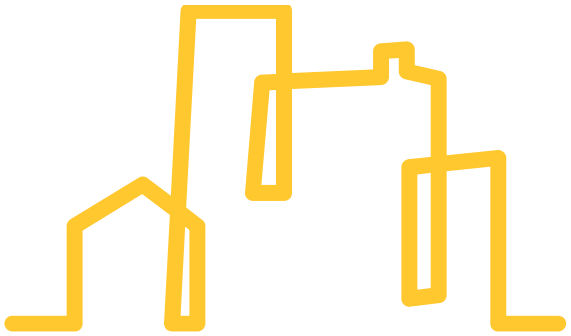
Thank you!

Q&A



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