Small Wireless Cells = M2M for Cellular

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The Small Cell Forum

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Promoting & enabling small cell technology based on licensed spectrum, operator managed, edge-based intelligence

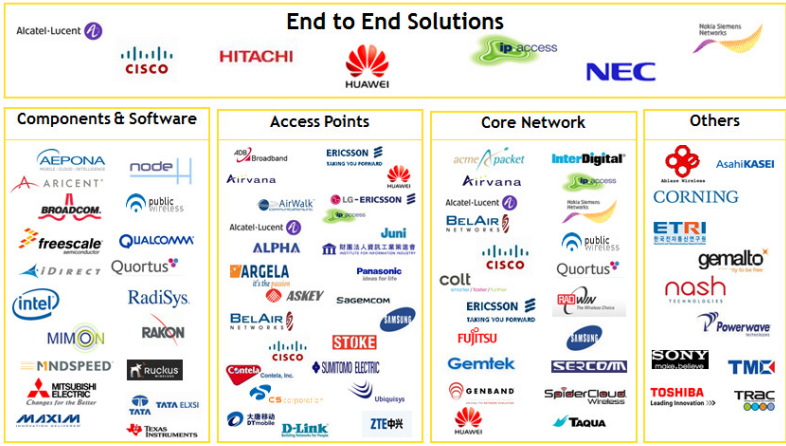
Not-for-profit, founded in 2007

Independent, Inclusive, International

Aims

- Ecosystem Development
- Market Education
- Driving open standards

65 operators covering 1.99 billion mobile subscribers – 34% of total



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

Applications of small cells

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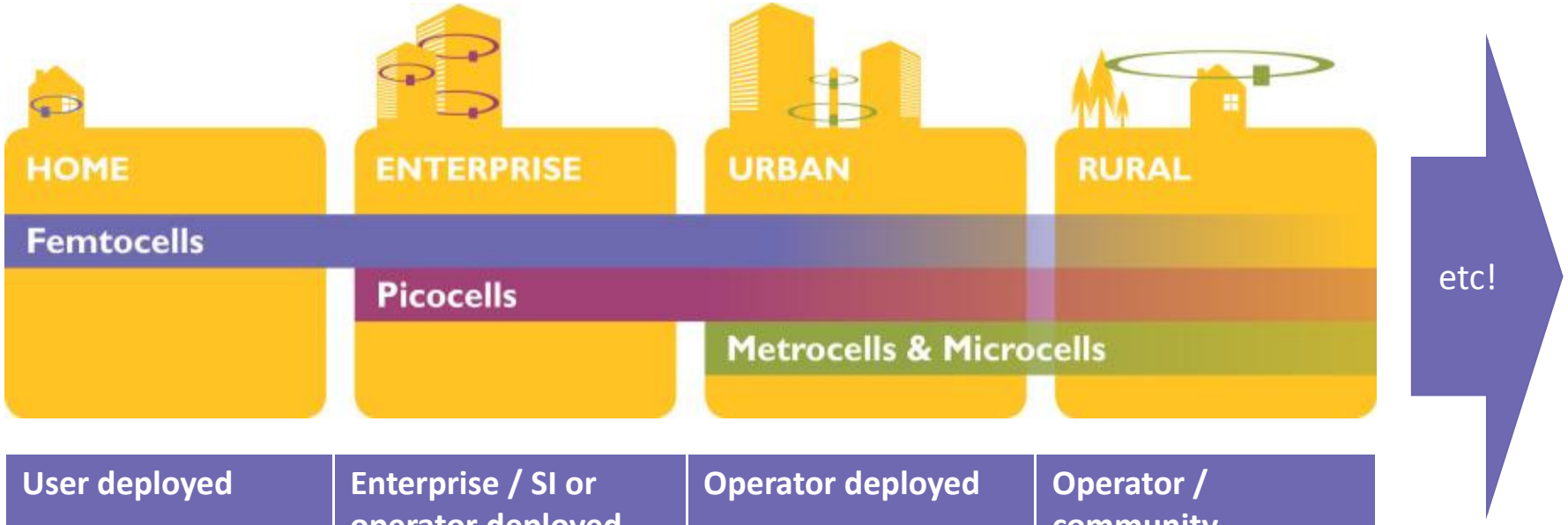

User deployed	Enterprise / SI or operator deployed	Operator deployed	Operator / community deployed
Shared backhaul	Shared or dedicated backhaul	Dedicated wired or wireless backhaul	Dedicated wired or wireless backhaul

An increasingly wide range of femto-enabled small cells: Small Cell Forum works to enable and promote all of these

Small Cell Apps:
Developer Forum Launched 2012

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Mobile apps for small cells are here — now!

The Small Cell Forum has published an industry-wide agreed set of API specifications that enable advanced mobile applications based on small cell technology.

The first applications based on these specifications have already been built by the Forum's vendor members. Demonstrations of small cell apps are now showing operators and developers the power and potential of this unique proposition.

Want to get involved? Start here!

Our API specifications are now available to the small cell community. The Forum is keen to see other bodies implement the completed specifications into the dominant industry-standard APIs. The specifications are for network-based APIs, which will allow operators and apps developers to drive the development of small-cell-powered open-access, enterprise and consumer applications.

DOWNLOAD API SPECS

Enhanced features. Lower cost. Faster data flows

The API provides small cell awareness information. That means small cells apps that

- incorporate enhanced presence, context and location-sensitive features

Small cell apps in Barcelona

The Small Cell Forum will be showing visitors to Stand G19 in Hall 1 at the 2012 Mobile World Congress how apps are adding even more value and possibility to the small cell proposition.

And it's got some impressive support, in the shape of the pioneering names in the small cell industry and some of the world's biggest technology companies.

GSMA OneAPI **Zonal presence sandbox**

Working through the GSMA's OneAPI initiative, the Small Cell Forum has just launched its Zonal Presence API for developers.

This provides a subscription mechanism for authorised third party applications to receive notifications of user activities within a Small Cell zone.

Open, accessible, simple to use

www.smallcellforum.org/developers/

Tech highlight: enterprise grid system

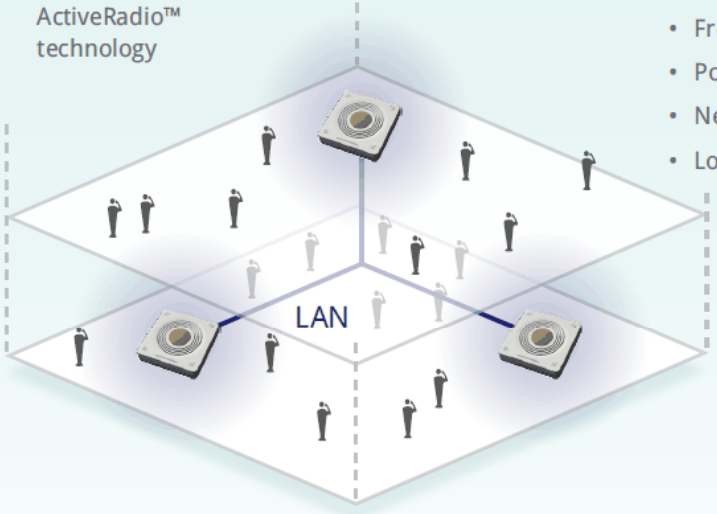
How the grid forms

1. Individual femtocells setup automatically and continuously adapt to their environment using Ubiquisys ActiveRadio™ technology

2. Femtocells identify neighbours and communicate with each other over the enterprise LAN

3. Ubiquisys ActiveSON™ technology enables femtocells to autonomously negotiate configuration and policy:

- Frequency distribution
- Power range
- Neighbour relations
- Load-balancing response



4. Calls are passed seamlessly between femtocells in the grid

5. Remove a cell, and its neighbours will extend their ranges to fill any gaps

6. When a cell nears capacity, calls are shared between neighbours

Benefits

- Simple – fits any building, scales easily
- Completely modular – no need for a local controller
- Very low cost – IT install with no radio planning required
- Flexible control – unlimited private and public access groups across multiple sites
- Increased workforce productivity and employee satisfaction
- Operator-proven: commercially deployed today

Technology

- 8 or 16 call femtocells, free standing or wall mounted
- 14.4 Mbps, 100-250mW output power
- Power over ethernet (PoE) and WiFi optional
- ActiveRadio™ technology for adaptive femtocell behaviour
- ActiveSON™ technology to form an adaptive self organising network

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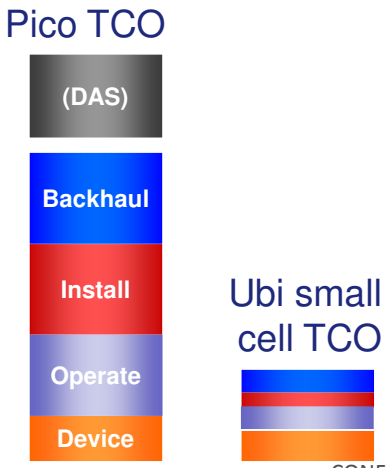
Ubiquisys SON summary

Ubiquisys has commercially deployed, self-install, self-managed SON solutions today

- Extensive set of interference mitigation techniques, adaptive to macro network changes, cell breathing and proximity detection
- Optimised spectrum use, co-channel with macro and straddle carrier for spectrum-scarce operators
- Optimised service, service automatically adapted to target area, straddle carrier to increase user capture
- WiFi-like installation for enterprise units, validated in commercial deployments (IT personnel installation)
- Serve from SME to the largest Enterprise with Ubiquisys Grid technology
  - Grows seamlessly with the business, from single to hundreds of units
  - Group SON: units in a group discover each other, auto-configure, set-up up service and monitor the grid during operations
  - Load balancing for capacity increase

What is SON and its significance for small cells

- Self Organising Network
  - It's a series of techniques that make small cells easier to plan, deploy and manage
  - 3GPP defined 9 principles around self-configuration of radio parameters, interference management, neighbour lists, service optimisation and load balancing
  - SON applies from single cells to large clusters
- SON = operational savings
  - The more sophisticated the SON tool set, the lower the small cells TCO
  - Operators agree that small cells can only happen in volume with SON
- Example:
  - Ubiquisys SON provides a x4-x5 TCO reduction compared to traditional picocells



Case study:
Network Norway Full Coverage

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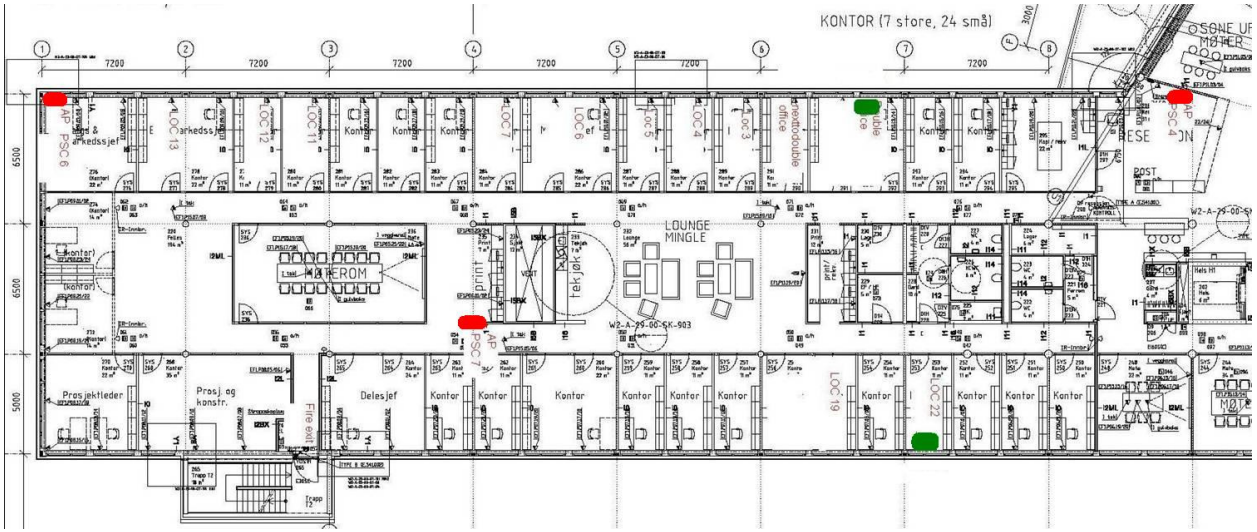
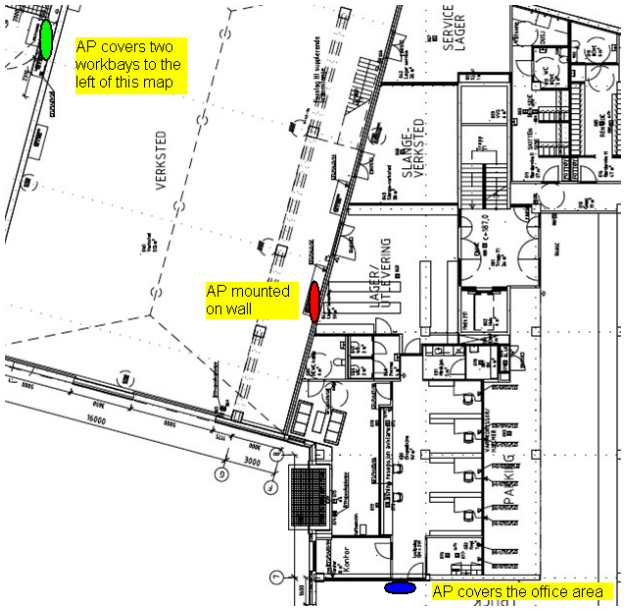
Real Field examples

- High variety of building types
- High variety of traffic profiles
- Ubiquisys SON adapts to all
- Excellent feedback with better than macro KPIs





The building challenge

- Large buildings
- Steel or concrete walls + metal layer windows
- Large storage or workshop areas
- Administration areas with partitioned offices
- Economically viable solution

Event drivers:

- Customer relocating to new offices
- Customers expanding their offices
- Swapping to 3G phones changes customer perception of their indoor coverage
- Coverage at home for key personnel

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What is SON?

The Self-Organising Network in Action

Feature	Network Norway requirement
Self-configuration: Connectivity establishment, and download of configuration parameters and software	
Self-optimisation: Adjustment of output power and neighbour lists based on base station output	
Self-healing: Adjusting parameters and algorithms in adjacent cells so that other nodes can support the users that were supported by the failing node (or a femtocell that was moved)	