## **Regulatory** approaches

Professor William Webb

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- Ways of managing spectrum
- Previous approaches to home/office communications
- Requirements for the femtocell
- Open issues
- Possible regulatory structures



- At the highest level
  - Command & control
  - Market forces
  - Unlicensed
- Unlicensed further subdivides into
  - Completely open (eg 2.4GHz)
  - Spectrum classes (not yet implemented)
  - Single technology / usage (eg DECT)
  - Light licensing (multiple variants)



- Unlicensed, single technology (DECT and CT2)
  - Has worked well but not technology neutral and may be inefficient
- Unlicensed, unrestricted (WiFi, BlueTooth)
  - Technology neutral, worked for data but not voice to date, some interference issues
- Licensed (femtocells)
  - Unclear whether will be successful, linked to a particular operator
- Light licensed ("DECT guard-band" 12 overlapping licenses)
  - Limited success to date problems with roaming and incoming calls, low power



- Work with widely available handsets and devices
- Worldwide availability and economies of scale
- Simple to set up (handsets allowed to access, roam onto home network, etc)
- Interference free in 99%+ of cases (automated interference avoidance)
- Accept incoming calls
- Different from current femtocell approach



- Should this be restricted to private use only (operators not allowed)?
  - What about coffee shops?
- Is regulation needed to enable incoming calls?
  - Eg mandate access to HLR
  - More fundamental change in industry structure
  - Or a regulated fee for terminating incoming calls to home cells



- Completely unlicensed (like 2.4GHz)
- Unlicensed but only for 3G/4G low power
- Unlicensed but only for home / office use
- Licensed but shared by any operator with cellular spectrum
- Licensed to a not-for-profit that runs the band for public benefit
- Licensed to fixed number of overlapping providers (current proposal)



Model	Widely available	Simple	Avoid interference	Incoming calls	Different from status quo
Unlicensed			$\bigcirc$		
Unlicensed, 3G/4G		$\bigcirc$			
Unlicensed home	$\bigcirc$	$\bigcirc$			
use					
Licensed, shared	$\bullet$				$\bigcirc$
cellular operators					
Licensed, not for					
profit					
Licensed overlapping					$\bigcirc$
bidders					

•Do we want something that works with minimal effort or something different?

- •Letting existing operators share it is the simplest approach but they can already deploy femtocells, would this really make any difference?
- •Unlicensed creates the greatest chance for change, but needs a mechanism to make it work and source incoming calls
- •Is the regulator and industry prepared to fight for something where the beneficiaries do not have a strong voice?

