



Small Cells: From Concept to Reality

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Verizon Wireless



The Family of “Cells”



MACRO



MICRO - Outdoor



MICRO - Indoor

Miles

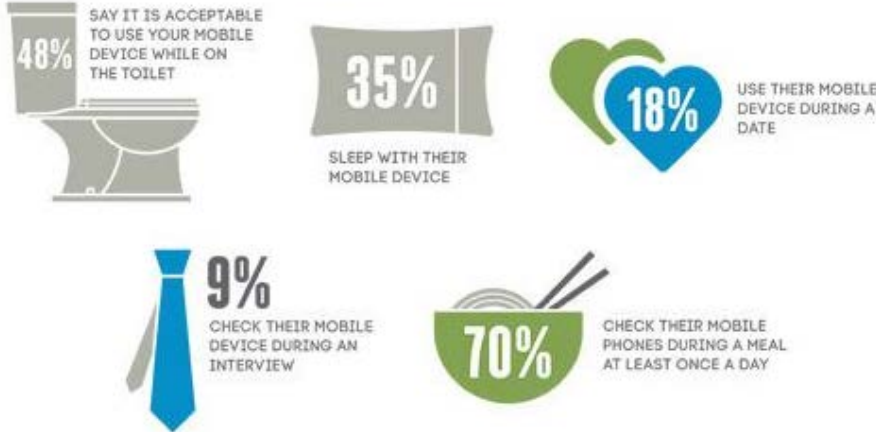
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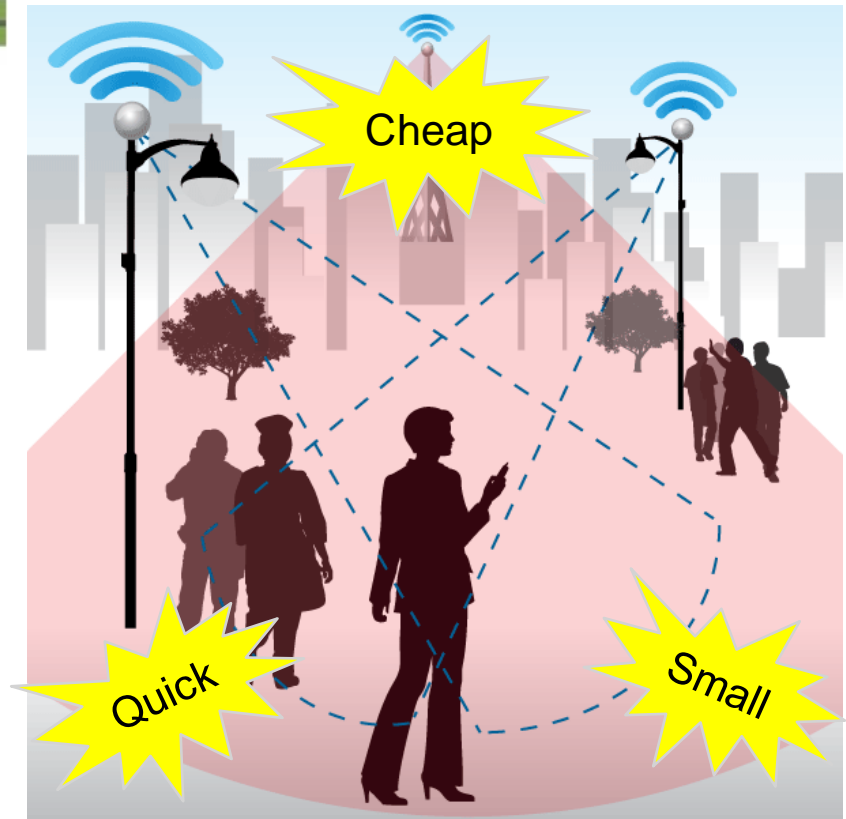
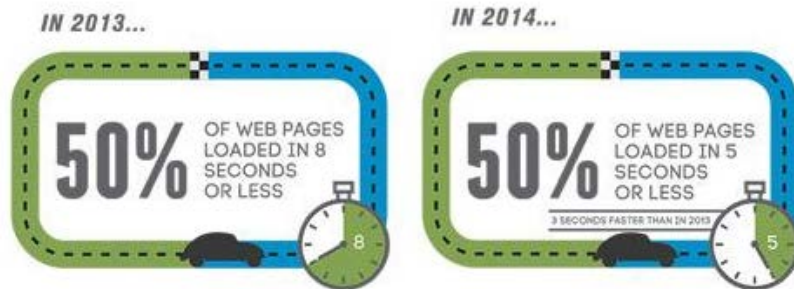
Tools in the Toolbox for Subscriber Capacity & Coverage

The Promise of Small Cells

FUN FACTS



SPEED IS INCREASING ON THE MOBILE WEB



“Small cells provide better outdoor-to-indoor coverage considering that 40% of mobile traffic originates from home and 25% from work”



Making It Cost-Effective

		Macro	Micro
Site Acquisition	<i>Rent</i>	more	less
Backhaul	<i>Backhaul Build</i>	same	same
Build	<i>Equipment</i>	more	less
	<i>Construction labor</i>	more	less
	<i>Integration</i>	more	less
Net Capital		Net More	
Routine Mtce	<i>Dispatch</i>	same	same
Backhaul	<i>MRC</i>	more	less
Power	<i>Energy Consumption</i>	more	less
Site Acquisition	<i>Rent</i>	more	less
Net Expense		Net More	

Net Cost has to be <
Offload factor



Offload Factor is driven
by **Placement Precision**



Placement Precision is
driven by **accurate** RF
planning and site
availability

$$(1/n) * \text{offload} \geq (1/n) \text{ macro cost}$$



Building it Faster

	Macro	Micro
Site Acquisition	same	same
Regulatory Requirements	same	same
Zoning & Approval	same	same
Backhaul Build	same	same
Build	more	less
Integration	more	less
Net Build Time	Net More	

- Educating Municipalities
- New Power Designs (Poles, Fiber Meet)
- Position Precision
- Backhaul optimal design



Getting to the Next Level

- Reliability – Generators, Back-up Batteries
- Availability – Routine Maintenance Plan
- Safety – Vandalism, employee access
- “Relocatability” – urban design flexibility