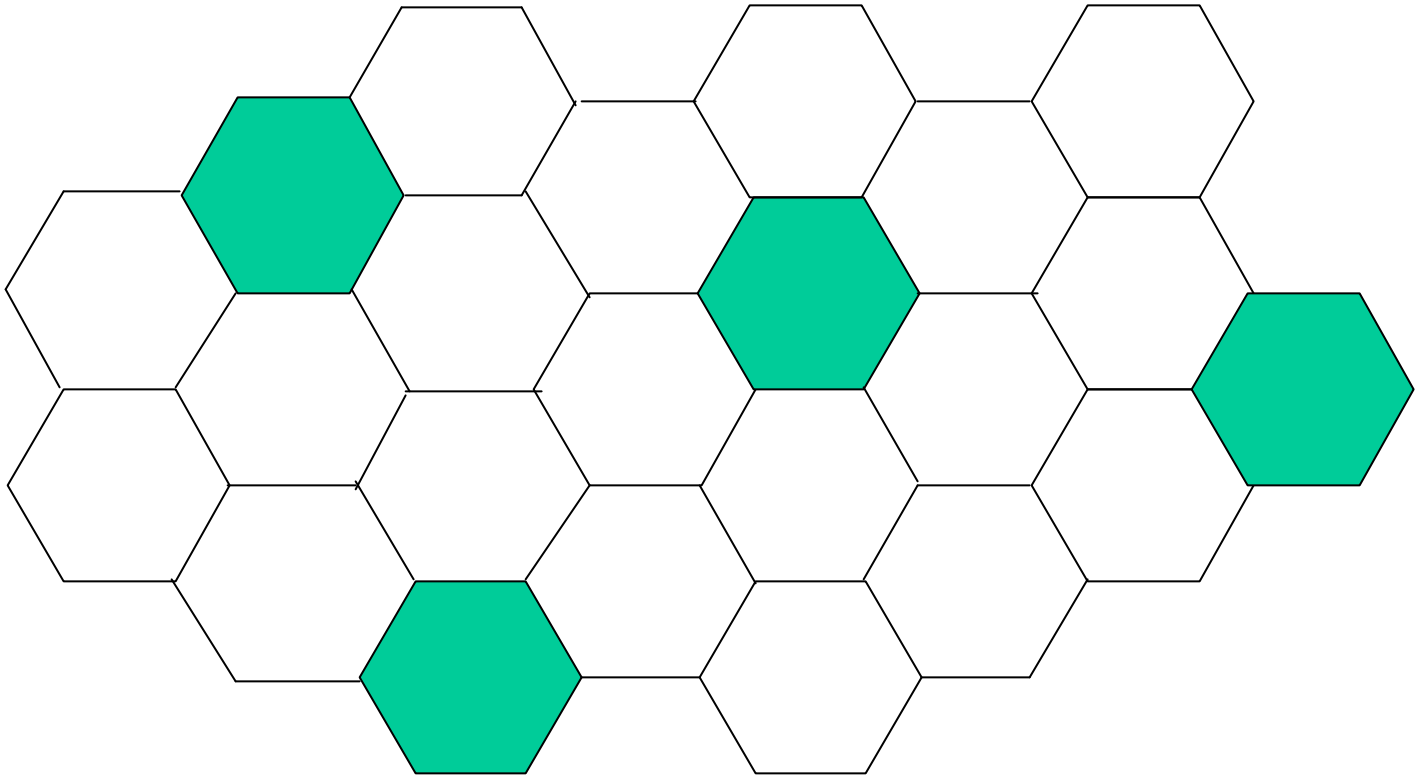
When Hexagons were Hexagons And We Knew the Truth



Euclidian Perfection

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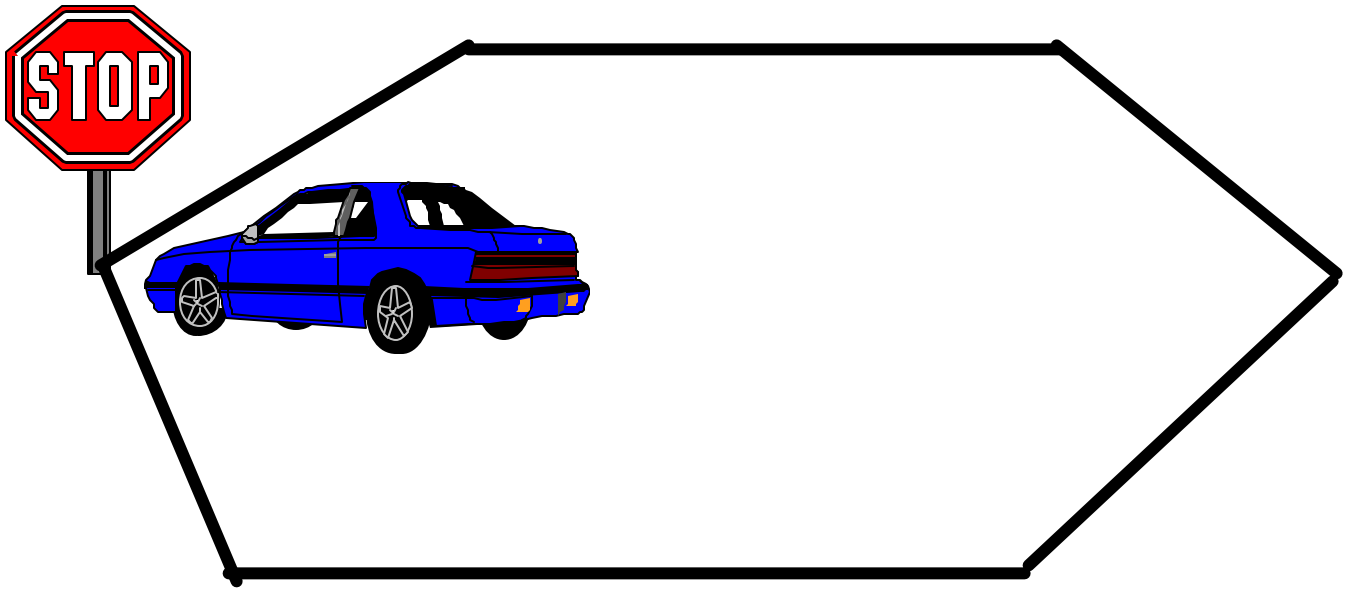
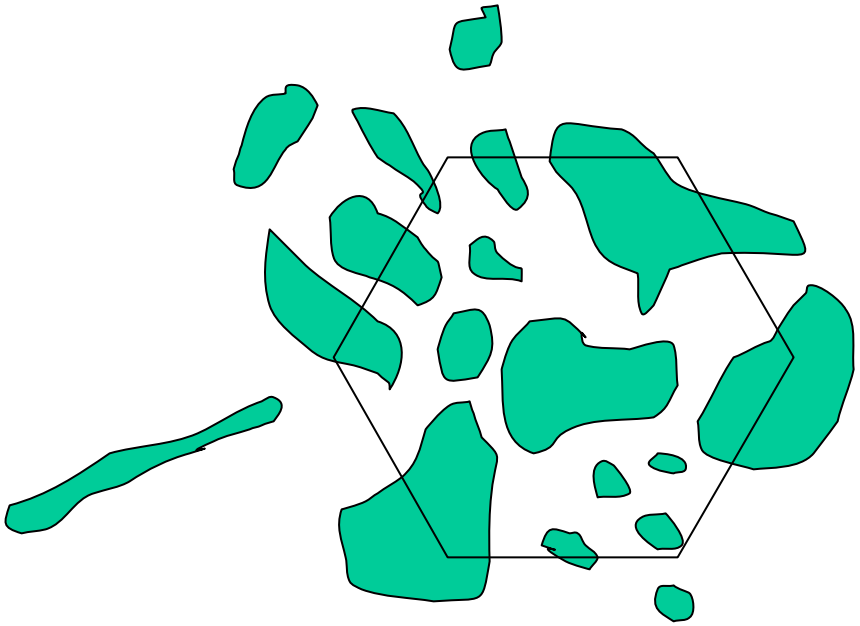
Controlling Interference



Keep ‘em in the cell! (Phase-ranging)

The “Research View”
Radio waves don’t make hexagons



Self-Determination in the cell world

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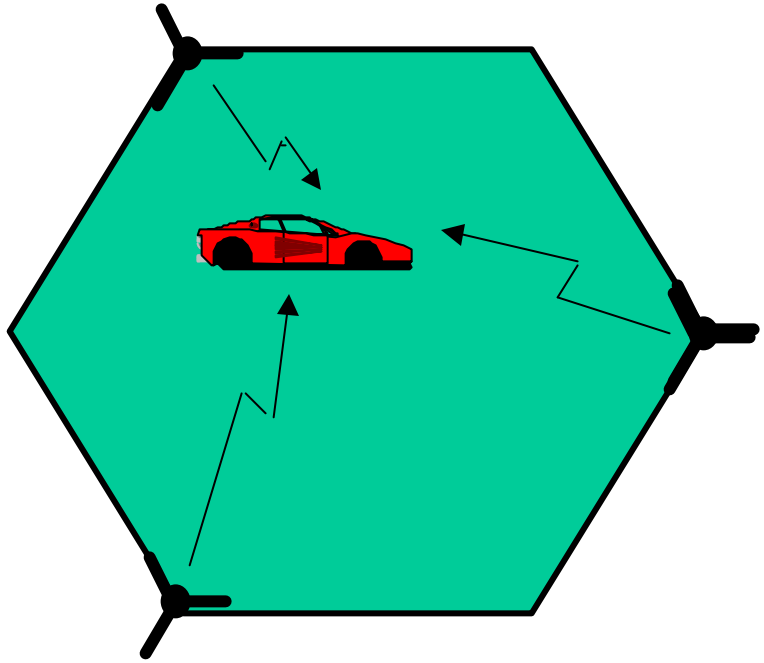
And Then we invented the “corner-excited cell”



And Then ….

The Great Bandwidth Controversy

Motorola vs. the Bell System

“Political Science”

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The Great Bandwidth Controversy

Motorola vs. the Bell System

“Political Science”

Bell Labs: Wider Channels reject interference so reuse distances are reduced- more channels per cell

Motorola: Narrow Channels means less spectrum for Cellular – more channels for “fleets”

Objective: Voice quality “good” (or excellent) over 90% of Cell (at 60 mph with Rayleigh fading).

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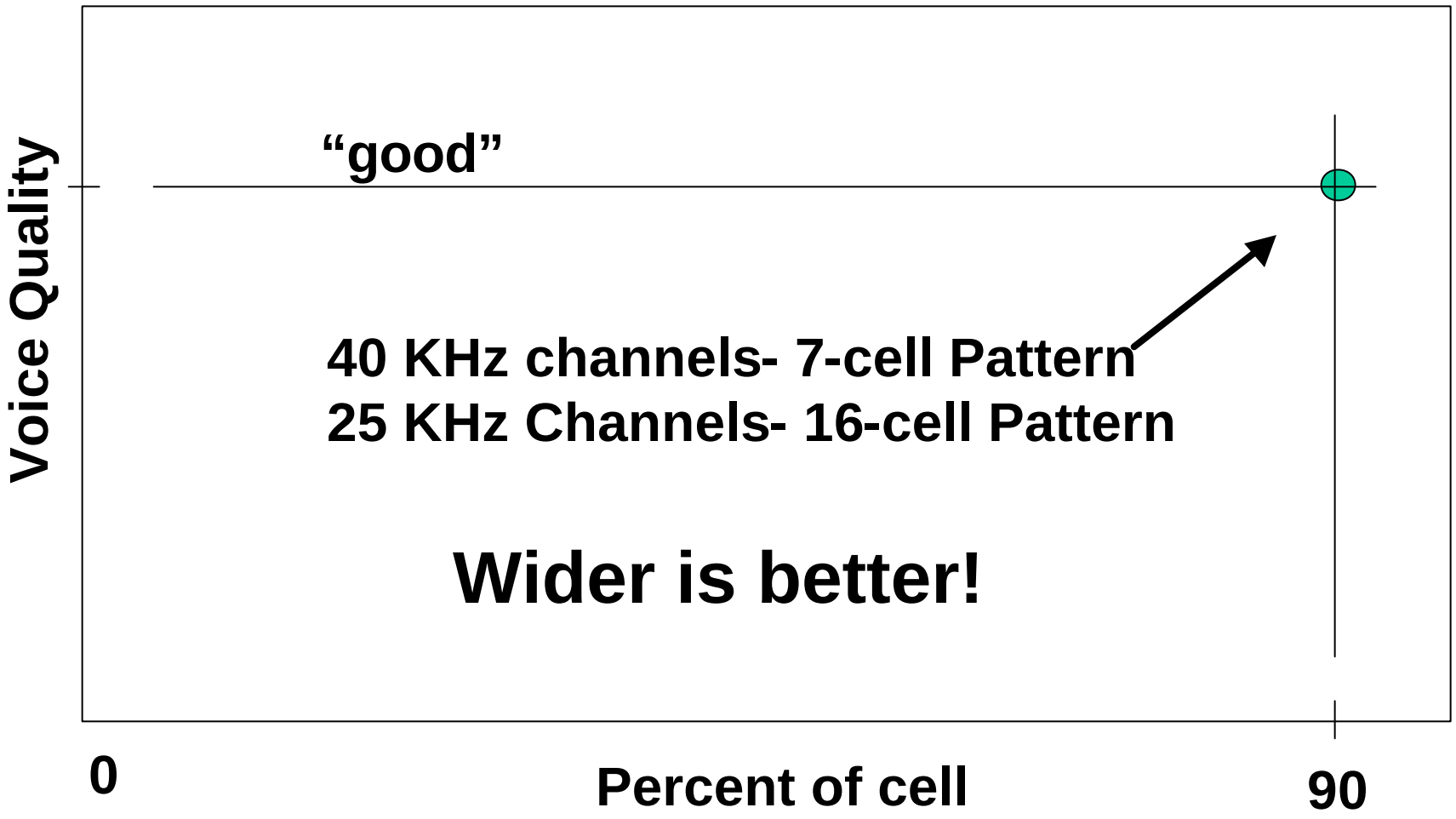
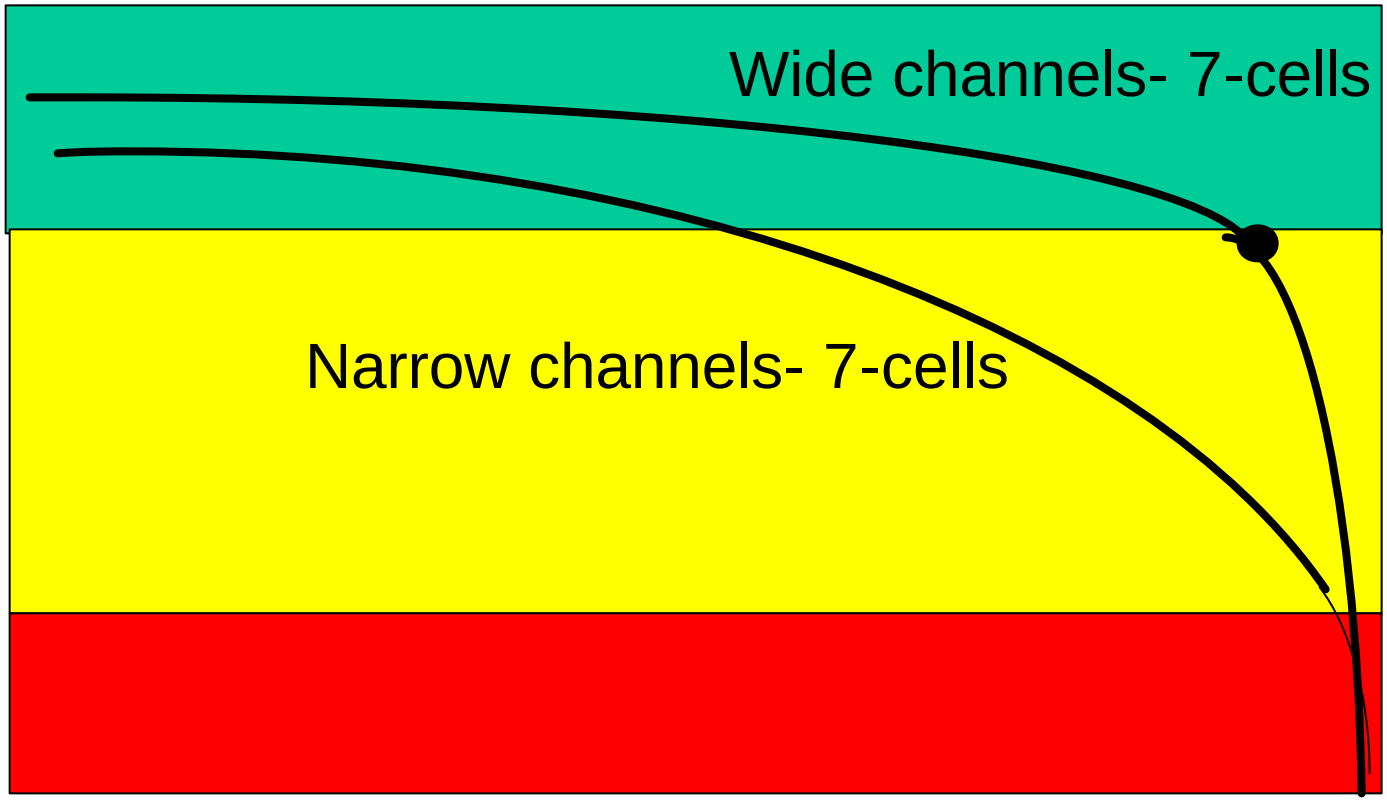
We Were Right (of course)!



Equal Reuse Distance (S/I)



Narrow sounds worse but is more “efficient”

Equal at 90 percentile

Wide is more efficient, but different

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Equal Efficiency

Which performance is “better?”

And then there's

- Base station "tolerances"
- Road and street noise
- Variability during call
- Different speeds

And then there's

- Base station "tolerances"
- Road and street noise
- Variability during call
- Different speeds

And now-- the new world of "digital quality"

Digital Processing for more reuse?

And finally!
The “measure” of a system

The good old days: Spectrum as a “national resource”

Pre-cellular : Channels / MHz
Cellular : BH Erlangs / MHz / Sq Mile

And finally!
The “measure” of a system

The good old days: Spectrum as a “national resource”

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New Technology: BH Erlangs / MHz / Sq Mile / $

And finally!
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Auctions: BH Erlangs / $

And finally!
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The good old days: Spectrum as a “national resource”

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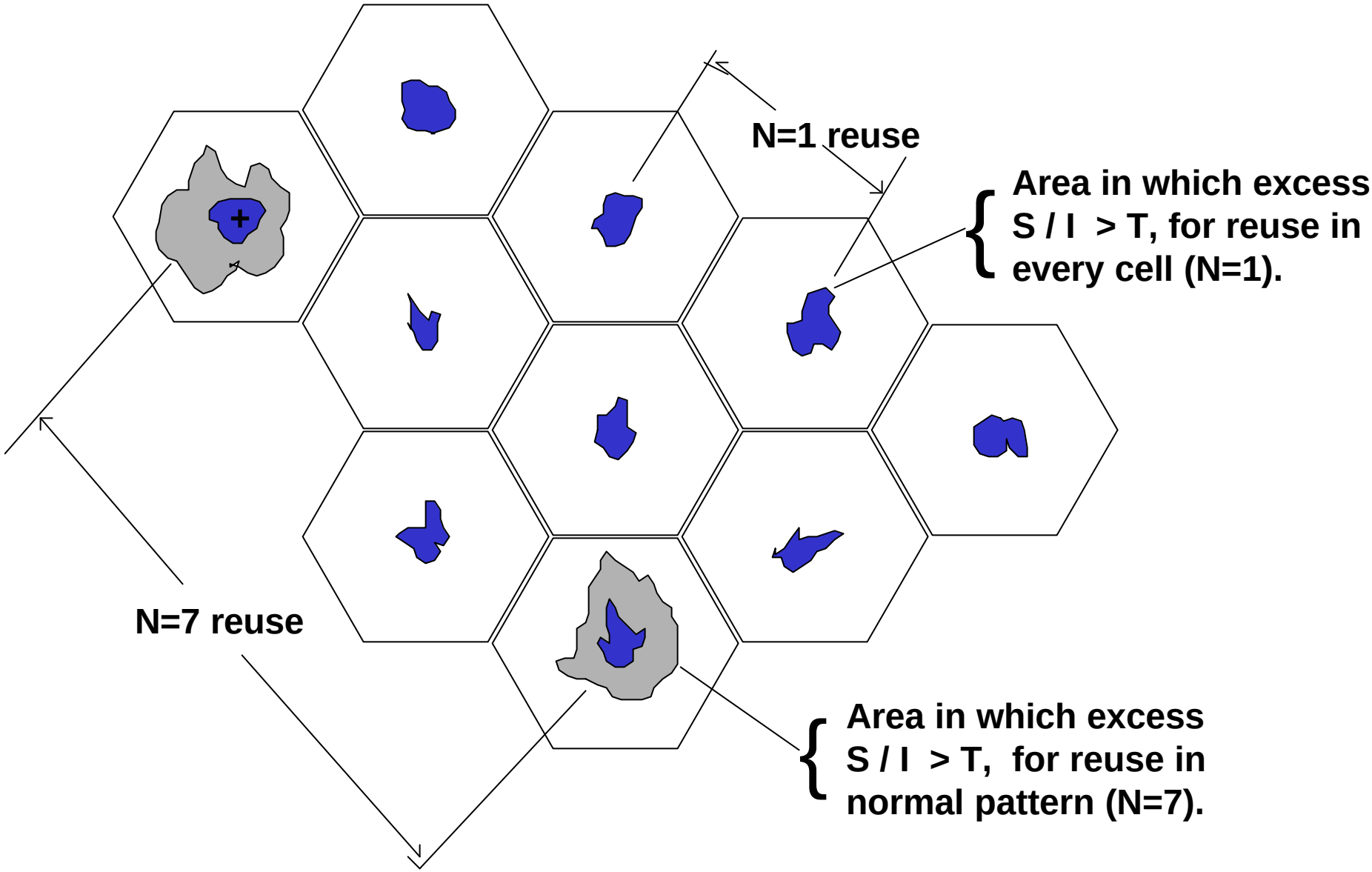
Cellular : BH Erlangs / MHz / Sq Mile
New Technology: BH Erlangs / MHz / Sq Mile / $
Auctions: BH Erlangs / $
Wireless Data?

- **Bit-rate?**
- **Energy / bit?**
- **Cost / bit?**

“Excess Capacity” for Information



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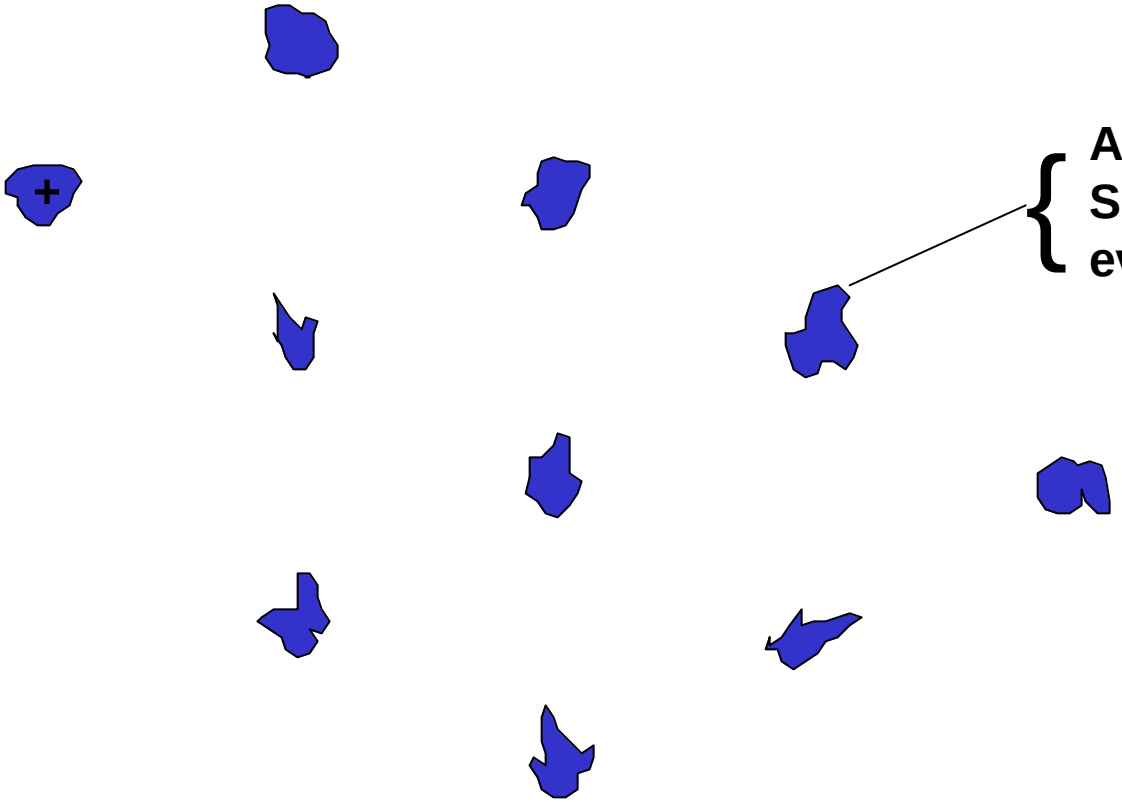
Infostations



Infostations

- Isolated pockets of short-range high-rate coverage
- Strategic locations provide “pseudo-ubiquity”
- Limited infrastructure and spectrum required

LOW COST PER BIT !