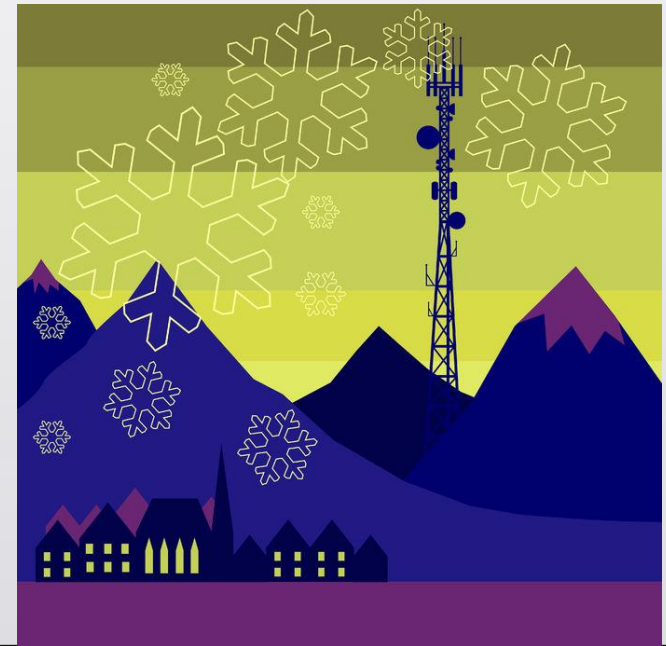


# Small cells in private networks

## An Overview

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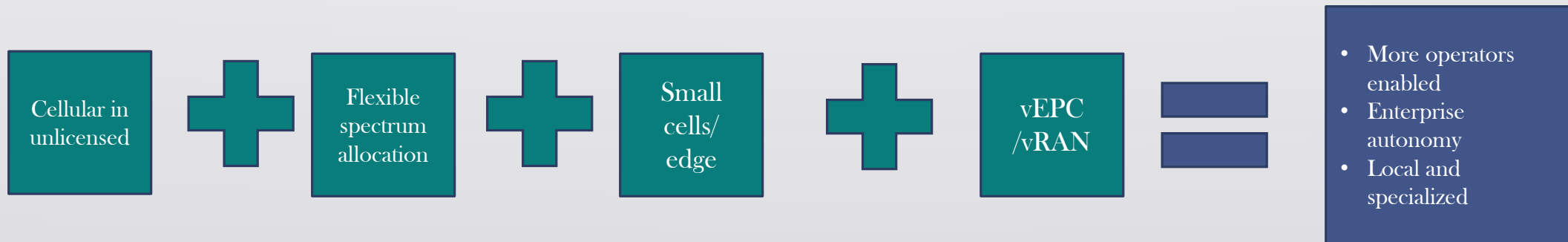
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# Private cellular may or may not involve MNOs ... it almost always involves small cells

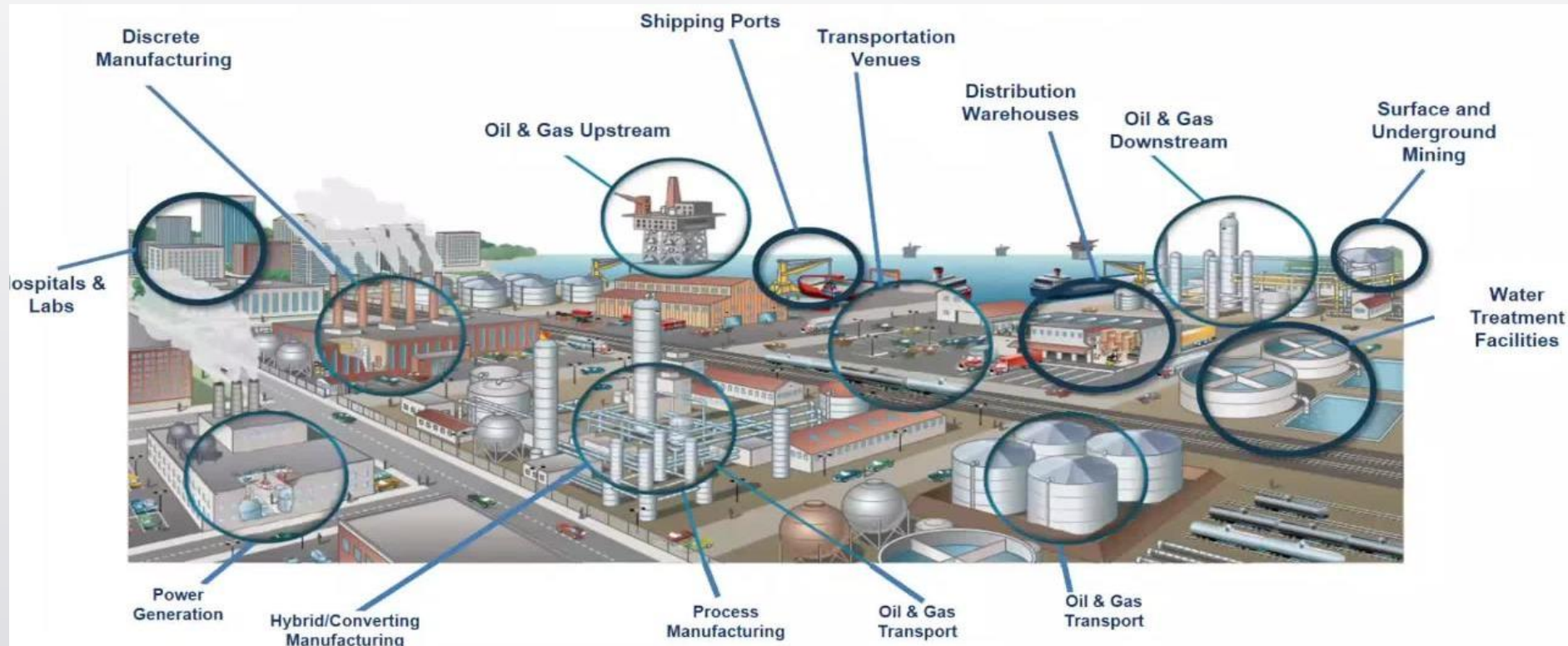
- Governments put pressure on regulators to support industry mobile
  - German auction
  - Consultations e.g. UK – focus on high frequency and indoors
- More co-investment with industry e.g. Japanese utilities
- Shared spectrum enables MNO-free approach e.g. CBRS
- But there are opportunities for MNOs too
  - Ericsson/Telia
  - Nokia WiNG

# New enablers are emerging to support diverse private cellular options

- The networks are neutral host, supporting third party service providers with specialist expertise, in a more flexible way than the traditional MVNO agreement.
- Networks are rolled out where demand is identified, rather than on a national scale. Localised or vertical deployments, with the superior economics of targeted build-out.
- Cloud-based services can reduce the capital and operating cost of a new network, and support service providers on a 'pay-as-you-grow' basis.



# Private LTE services will target a rising number of industries



# Private small cell networks are proliferating, often driven by vendors

- Ericsson Industry Connect – Scania, in-building LTE and local core
- Nokia – Brazilian power distributor Elektro, LTE small cells
- Airspan
  - 8km<sup>2</sup> container terminal
  - Dense Air



# Crown Castle: Tourist and staff services in Central Park

- Average number of visitors to Central Park per day: 100,000
- 843-acre park is host to large events, including concerts on the Great Lawn and the finish line of the New York City Marathon
- Nodes placed on existing infrastructure to preserve the park's natural beauty
- Worked closely with several governing bodies including: Department of Information Technology & Telecommunications, Department of Transportation, Central Park Conservancy, Landmarks Preservation Commission, and the Department of Parks and Recreation





# Private small cell network to connect remote oil operations



Challenge Networks deployed the private LTE HetNet with Nokia's Flexi Zone Small Cells and Multiradio 10 Base Stations



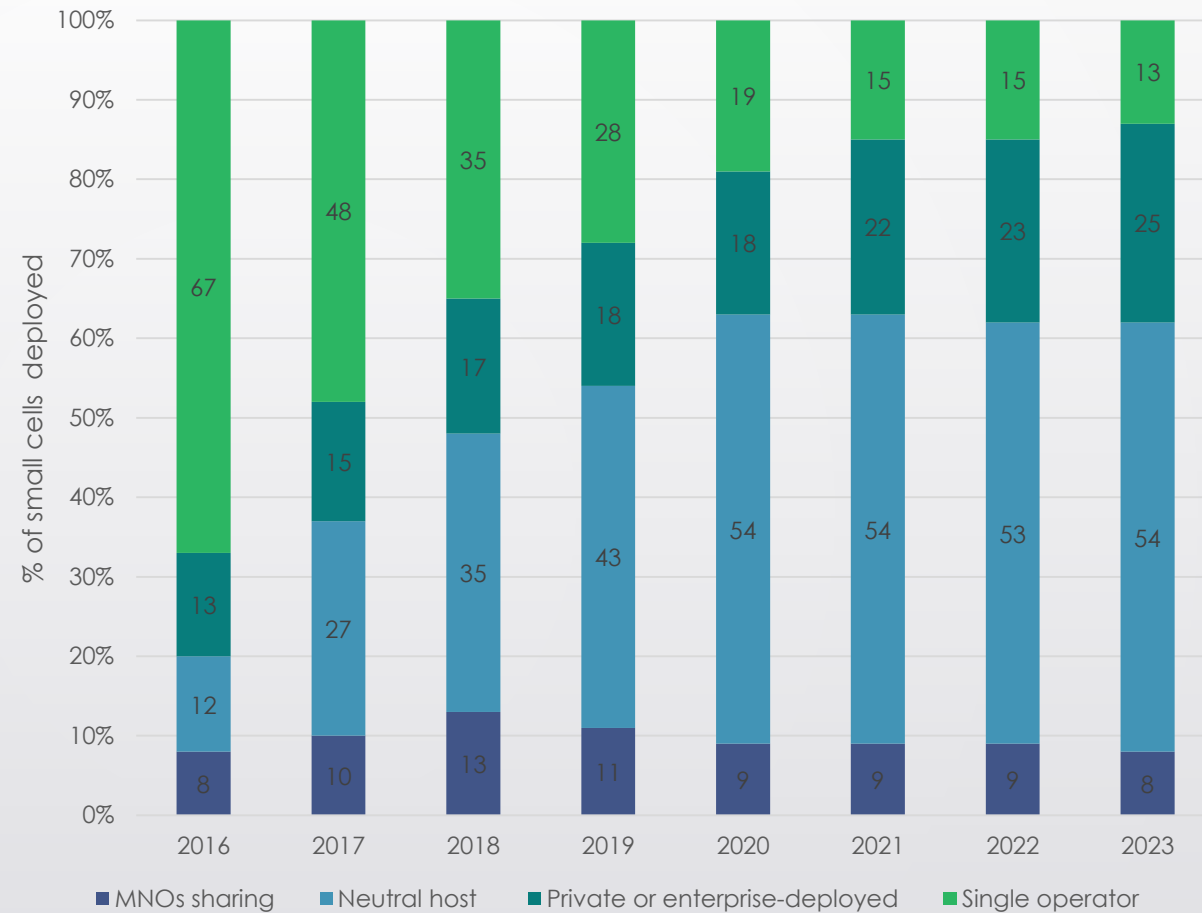
Beach Energy is Australia's largest onshore oil producer



“The new LTE network allows our staff to access key systems, facilities and production information throughout our western Cooper Basin field area, reducing requirements for travel between sites, making operations more efficient, saving money and significantly enhancing safety”  
Neil Gibbins, Acting Chief Executive Officer at Beach Energy Ltd

If neutral host is supported, it will greatly accelerate deployment of small cells

Despite sharing, neutral host will boost small cell numbers by 45% by 2023



Deployment and management of non-res small cells (% of installed base), by operator type. Source: Rethink