



# Supplemental Coverage from Space: Toward a Single Network Future



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Note: The views expressed in this presentation are my own and may not necessarily represent the views of the Federal Communications Commission or its Commissioners.



# Outline

- Single Network Future
- Supplemental Coverage from Space
- Non-Terrestrial Networks
- Earth Stations in Motion
- Summary





# Single Network Future

- Expanding broadband access relies on a diverse set of broadband networks and access technologies
- Future networks will interact in ways that are seamless and invisible to the end user
- Already witnessing examples of this convergence, with reliance on license-exempt/unlicensed access technologies such as Wi-Fi for voice and data using the same devices for terrestrial cellular mobile wireless access
- Satellite added to an increasing mix of network access capabilities that is only expected to grow





# Supplemental Coverage from Space

- On March 14, 2024, the Commission adopted a Report and Order (R&O) and Further Notice of Proposed Rulemaking (Further Notice), establishing:
  - Regulatory framework – the first of its kind – enabling hybrid satellite-terrestrial networks to connect everyone
  - Direct to consumer handsets using spectrum previously allocated only to terrestrial service, through partnerships between satellite and terrestrial operators
  - Areas not already covered by terrestrial networks will be connected using their existing devices via satellite-based communications, through coordination
  - Intended to encourage technological advancement, more efficient spectrum use, and expand communications and critical emergency services



# Supplemental Coverage from Space

- The Supplemental Coverage from Space (SCS) Report and Order:
  - Modifies the U.S. Table to authorize bi-directional, secondary MSS operations in certain spectrum bands that have no primary, non-flexible-use legacy incumbents, federal or non-federal
  - Authorizes SCS only where one or more terrestrial licensees— together holding all licenses on the relevant channel throughout a geographically independent area (GIA)—lease access to their spectrum rights to a participating satellite operator, whose part 25 license reflects these frequencies and the GIA
  - GIAs are: (1) CONUS; (2) Alaska; (3) Hawaii; (4) American Samoa; (5) Puerto Rico/U.S. Virgin Islands; and (6) Guam/Northern Mariana Islands



# Supplemental Coverage from Space

- The SCS Report and Order:
  - Enables certain SCS operations domestically in the United States while also reminding our licensees that SCS operations shall not cause harmful interference to other countries' operations that conform to the ITU Radio Regulations and shall eliminate any harmful interference immediately
  - Available frequency bands initially include:
    - 600 MHz: 614-652 MHz and 663-698 MHz;
    - 700 MHz: 698-769 MHz, 775 MHz-799 MHz, and 805-806 MHz;
    - 800 MHz: 824-849 MHz and 869-894 MHz;
    - Broadband PCS: 1850-1915 MHz and 1930-1995 MHz; and
    - AWS-H Block: 1915-1920 MHz and 1995-2000 MHz

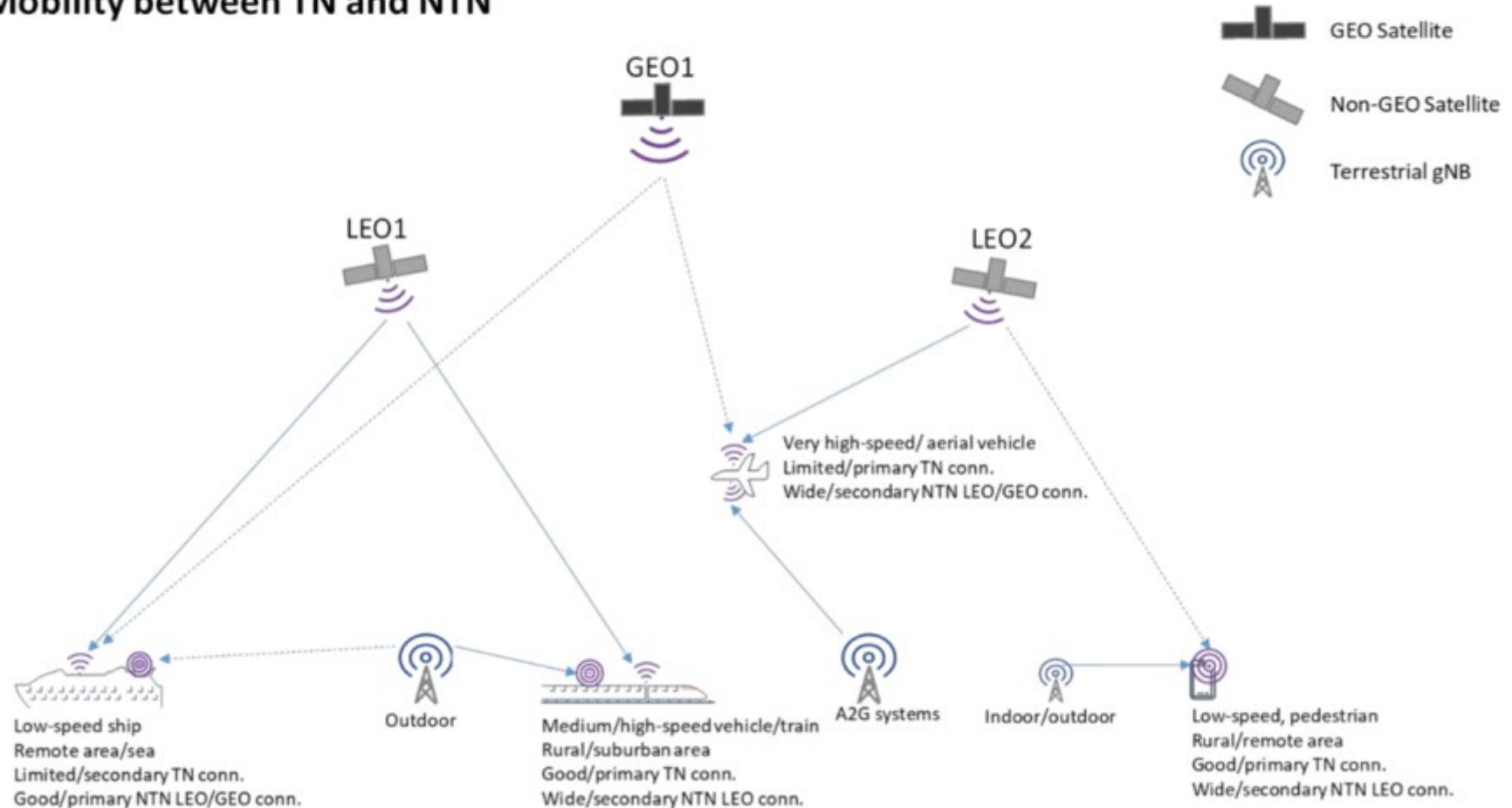




# High-Level Architecture

Figure 4.3 Typical example of NTN-TN interworking (source: 3GPP 38.821<sup>24</sup>)

## Mobility between TN and NTN





# Supplemental Coverage from Space

- SCS licensing procedure:
  - Space stations:
    - Satellite operators file a new or modified application:
      - Requested frequencies and technical details
      - Orbital debris mitigation plan
      - ITU satellite network filing
      - Leasing agreement with terrestrial mobile network operator
        - » Including coverage area description
        - » Considerations for international borders and protected sites
    - FCC Bureaus will review the application to determine if it's in the public interest and make a decision
  - Earth stations:
    - Licensed by rule, under existing terrestrial license procedures
    - Subject to equipment certification, waived for existing devices
      - Until November 30, 2024, not applicable to new or modifications





# Supplemental Coverage from Space

- The SCS Further Notice of Proposed Rulemaking:
  - Seeks comment on ways to propel industry toward truly ubiquitous automatic location-based routing of all 911 calls to accelerate connections between first responders and those who need help, regardless of their location.
  - Seeks further comment on ways to improve the coordination process between federal and non-federal stakeholders in the SCS context and on whether additional rule changes or policies are necessary to avoid harmful interference to radio astronomy and related services beyond already adopted licensing procedures



# SpaceX Petition for Rulemaking

- According to SpaceX, the FCC should reconsider “the one-size-fits-all aggregate out-of-band power flux-density (“PFD”) limit of  $-120 \text{ dBW/m}^2/\text{MHz}$ ”
- Instead the Commission should adopt “accepted ITU interference protection threshold for terrestrial networks of  $-6 \text{ dB}$  interference-to-noise ratio (“I/N”)”
- By doing so, SpaceX claims the Commission can potentially bring an order of magnitude better service in higher frequencies without causing risk of harmful interference to terrestrial services in adjacent bands
- The Commission is still considering next steps





# Examples of Announced Partnerships



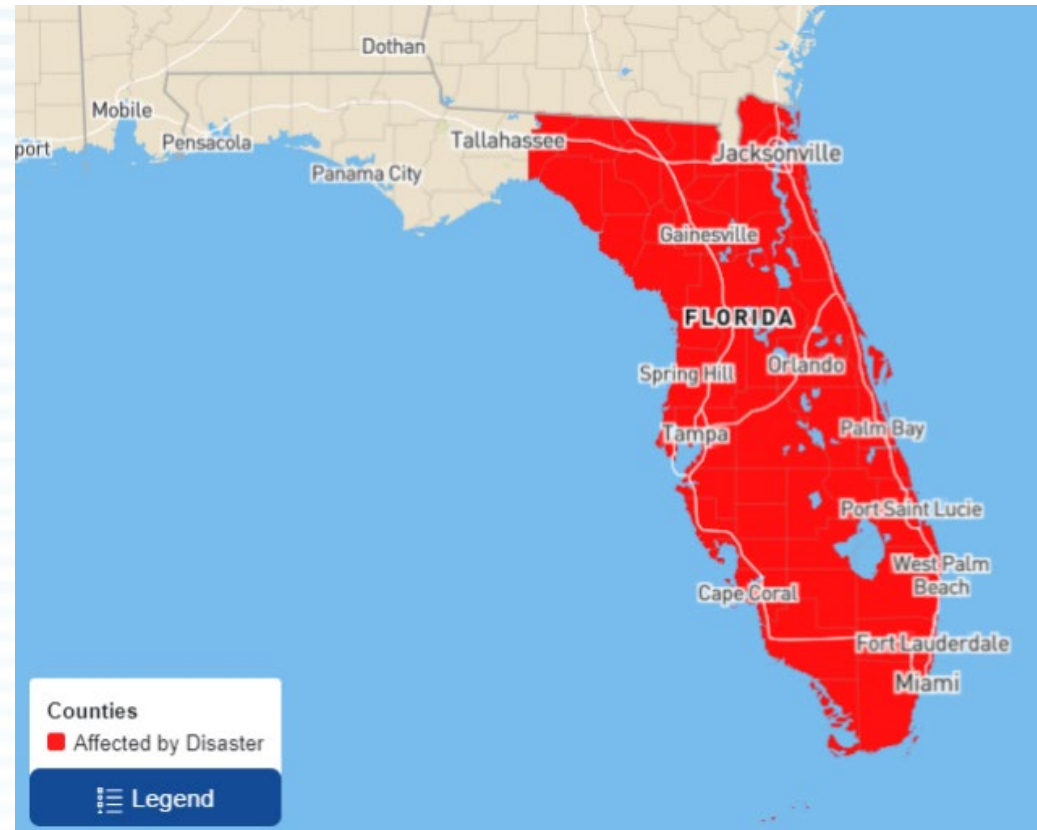


# Disaster Response

Hurricane Helene (as of 10/14):



Hurricane Milton (as of 10/14):







# Experimental Licensing Examples



**HG** Higher Ground



**LYNK**



totem  compass



**AST**  
SpaceMobile



omnispace



# Earth Stations in Motion

- Satellite-based technologies under three categories:
  - earth stations aboard aircraft (ESAA)
  - earth stations on vessel (ESV)
  - vehicle-mounted earth stations (VMES)
- ESIMs enable the provision of very high data rate broadband communications, navigation, situational awareness, and other services to mobile platforms that often cannot be served using other communications technologies.
- Rules for ESIMs adopted by the Commission in 2020





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# Summary

- As part of the Federal Communications Commission vision for a Single Network Future, agency has been taking steps to flexibly allow new and emerging services to supplement connectivity across the U.S.
- Innovation and standardization of technologies, and integration of space-based services into the wireless ecosystem, benefits consumers and the public
- The Commission will continue to explore and examine flexible ways to enable breakthrough advancements in providing new services while protecting incumbents





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