Federal Register Notice: 89 FR 12871, https://www.federalregister.gov/documents/2024/02/20/2024-03400/request-for-information-on-the-national-spectrum-research-and-development-plan, February 20, 2023.

Request for Information on the National Spectrum Research and Development Plan

Small Cell Forum Ltd (SCF)

SMALL CELL FORUM Ltd
PO Box 23
Dursley
GL11 5WA UK

t [redacted]
e info@smallcellforum.org
w www.smallcellforum.org

A response to the Request for Information on the National Spectrum Research and Development Plan - 03/21/2024

About the SCF[1]

SCF is a global organization whose mission is to enable and accelerate the sustainable digital transformation of industry, enterprises and communities. We do this by supporting a range of agile, cost-effective, scalable, cellular infrastructure and solutions for established and emerging service providers and deployers.

Our Membership & Board is drawn from across the global Telecoms supply chain. Countries and Regions that are represented include (but are not limited to) UK, EU, US, India and Middle East. Members come from the Service provider and neutral hosting as well as network product and chipset segments.

We gather requirements from service providers' businesses and, directed by our Board, these inputs shape our work program. Our specifications, technical papers and enterprise-focused outputs are made freely available to benefit the wider industry.

Today our members are working on projects spanning disaggregated network architectures, private networks, neutral host requirements and business model evolution, 5G small cell products, and policy and regulation.

Response to R&D Plan

Having reviewed the National Spectrum Strategy from the National Telecommunications and Information Administration (NTIA), we have the following recommendations regarding the creation of the R&D plan.

The SCF has noted the development of initiatives regarding the concept of a **Spectrum Sandbox**. We bring to your attention recent notable activities in the UK[2] and in India[3]. Members of the SCF take an interest in these activities and in some cases are participating. We see relevance of the Spectrum Sandbox in informing multiple of the pillars of the strategy, in particular pillar one and pillar three:

- For Pillar One establishing a spectrum pipeline to ensure U.S. leadership in advanced and emerging technologies. The spectrum sandbox can enable an evidence-based approach to the technology and spectrum bands mix in which efficient use of spectrum can be improved through the optimisation of technologies across the 7-layer ISO stack.
- For Pillar Three establishing Unprecedented Spectrum Access and Management through Technology Development. The spectrum sandbox concept enables an evidence-based approach to the refinement of data driven and Telecoms management system approaches. This may lead to aligned Spectrum user and spectrum regulator automated mechanisms. The CBRS protocol has been seen to enable usage of spectrum in a

[1] https://www.smallcellforum.org/about-us/
[2] https://uktin.net/whats-happening/news/everything-you-need-know-about-spectrum-sandboxes
[3] https://www.deccanherald.com/business/dot-unveils-spectrum-regulatory-sandbox-to-promote-r-d-in-telecom-2931836

particular band, this may be expandable to other bands, or new mechanisms and automations can be discovered through R&D.

A typical Spectrum Sandbox may be constituted as a one-off collaborative project between industry and academia or could be a capability built into existing facilities in the US or collaboratively with similar initiatives overseas. Typically, the Spectrum Sandbox would have the following activities:

1. Deployment of (pre-)commercial systems to run trials and gather data to capture real world performance of radio systems. Typically to investigate the efficient use of spectrum for co-existence of pairs of technologies and how the protocols and algorithms can be adjusted within existing standards or to investigate evolution of standards. Pairs could for example include Wi-Fi and mobile, Satellite and private networks spectrum, x-haul like configurations with fronthauling and backhauling co-existence.
2. Simulation and modelling to utilise the data from the trials systems and perhaps also to extend the insights through further simulations that investigate extrapolations from the trials.
3. Economic analysis that investigates the cost and benefit implications of the technology innovations and the more efficient use of spectrum. In the case of co-existing systems, the degree to which different efficient use of spectrum approaches can have wider economic benefits can be tested as part of the sandbox conclusion development.

From an area network (City, Campus, in-building, near in-building) perspective, where multiple stakeholders are involved, warranting infrastructure capacity to enable infrastructure sharing and enabling of neutral hosting multi-operator approaches. We see the following opportunities for R&D investigations framed within a spectrum sandbox:

- Coexistence / Interference (Adjacent / co-channel, multi-path, and other wireless characteristics)
- Adjacent Band considerations
- Spectrum aggregation and Carrier Aggregation)
- Power level studies
- Scenario based sharing studies (WLAN/WWAN) (Indoor/Outdoor/Mixed)
- “unexplored’ bands such as 7-24 GHz, including Channel Models
- Spectrum quality studies (stability, availability)
- Drone-based / Swarm Small Cell deployments
- Sensing and Fast Mitigation Spectrum Studies
- Novel spectrum sharing techniques for Dynamic Users
- Dynamic Spectrum Slicing
- Disjoint Spectrum Banding
- Use of data-driven, AI-based realtime technologies for dynamic spectrum management
- Cross layer approaches to spectrum utilization and management

We welcome this opportunity to provide an input to the development of the National Spectrum Research R&D Plan. The Policy and Regulation Group of the SCF remains at your disposal for any clarifications and to further assist with the refinement of requirements of our recommended Spectrum Sandbox approach.

SCF Chair and Chair of the Regulatory and Policy Group (RPG) - [redacted]
SCF Chief Strategy Officer – [redacted]