Dynamic Spectrum Arbitrage (DSA) Intro

- DSA **Decouples** Spectrum ownership and wireless service
- Allows wireless operators to lease excess capacity to other wireless operators and MVNOs and monetize underutilized resources
  - Competitors
  - Non-traditional
  - Roaming Partners
- Making excess capacity available for lease dynamically
  - Rivada DSA Technology allows for a dynamic bandwidth open access marketplace
    - Will lead to Commoditization of Spectrum (a whole new industry)
- Possible enhancement to the present licensing process used by regulators (FCC)
Dynamic Spectrum Arbitrage (DSA) Intro

- DSA does not require provisioning the uSIM on the subscriber handset
- DSA does not require a mobile application or modification to the OS on a subscriber handset
- DSA enables dynamic usage consumption and tracking in geographic defined areas
- DSA works with multiple subscriber OS platforms such as Android and iOS
- DSA fosters innovations in wireless technology adoption
Imitation is the highest form of flattery...

- LSA (Licensed Shared Access)
- Delivers the equivalent of DSA without a marketplace to maximize the value of dynamically shared spectrum
Technology Overview

DPC and DSC

- Network Operator identified by PLMN-id
DSA Nodes

Dynamic Policy Controller (DPC)
- Coordinates resource allocations between networks

Dynamic Spectrum Controller (DSC)
- Manages Lease for Lessee or Lessor network

Bid Manager (GAA)
- Creates Lease parameters
- Bidding entry for Lessee

Element Management Systems (EMS)
- Separate EMS for each DPC and DSC
- Used to configure DPC or DSC
- Performs O&M Function for DPC or DSC

Arbitrage Entity (AE)
- Interface between DSA and Trading Platforms
- Publishes Leases
- Informs DPC to deliver lease
DSAFlex

Improves DSA Architecture flexibility
• DSAFlex = flexible integration approach by offering several approaches
  – DSAX : X Interfaces
  – DSA9 : MOCN approach (100% 3GPP)
  – DSA-Lite : Pure Roaming (100% 3GPP)
• DSA9 and DSA-Lite architecture do not need the X interface Service Packs (SP)
• DSA-X remains Rivada’s preferred integration approach for the long term
Technology Overview

**DSAX**

- Optimal solution, as it has all the features and capabilities for DSA
- Requires Software Packs (SP) to be implemented in OEM nodes
Technology Overview

**DSA9**

- Uses RAN Sharing approach between networks (MOCN)
- DSA implemented using existing OEM features
- Enables Rivada open access marketplace
- No SP or X interfaces required
- 100% 3GPP Standards approach
Technology Overview

**DSA-Lite**

- Pure Roaming process
- Roaming is supported by all OEMs and Wireless operators today
- Enables Rivada open access marketplace
- 100% 3GPP Standards approach
- MVNO approach
DSA Lease Grid

Sub Sector Cell Region (BU)

Sector or Cell Grid Region

Cell Site Level

Region 1

Cell Site Level

Sub Sector Cell Region (BU)

Cell Site Level

Bandwidth Unit (BU)

Broadband Orthogonal Resource Grouping
Patents

DSA is covered under the following patents that have been granted both domestic US and international. Other patent applications have been filed as well.

8068808, 8086280, 8,280,344,827,5349, 8279786, 8611848, 8670403, 8711721, 8717929, 8,787,944
8837418, 8892066, 8934439, 8934373, 8964685, 13/773,725, 2013/01213, 2012296566, 1469429
325864, 2,843,913, 2014101509, 9,088,989
Thank-you

Questions?

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