

**Case Study: Land and Sea Demo v2.0**  
April 4<sup>th</sup>, 2018 | San Diego, CA

**Background**

In October 2016, Silvus conducted a demonstration of its StreamCaster 4200 2x2 MIMO MANET radios at the behest of the US NAVY.

The demo involved:

- 1 x TOC located in the NAVSPECWARCOM facility at Naval Amphibious Base Coronado (NABC)
- 1 x Vehicle with HD camera driving a counter clockwise loop around South San Diego Bay
- 1 x Repeater site at NABC
- 1 x Repeater site at Fort Emory

StreamCaster capabilities demonstrated:

- Live viewing of vehicle's HD video stream at TOC
- Push-to-Talk (PTT) voice between TOC and vehicle
- Geo-tracking of all nodes in StreamScape

A time lapse video from the original Land and Sea Demo can be found here:

<https://www.youtube.com/watch?v=Yt-PAzAcGuw>

In tune to our ethos of relentless improvement, Team Silvus returned to "America's Finest City" in April 2018, to put its latest 4x4 StreamCaster models to the test.

**The Challenge**

With a minimal infrastructure of StreamCaster MIMO radios, deliver high throughput ad hoc network connectivity between a vessel operating in San Diego Bay and two vehicles traveling a ~20-mile loop around San Diego City and barrier islands.

## Technical Solution

The original Land and Sea Demo was accomplished using Silvus' StreamCaster [SC4200](#) 2x2 MIMO radios. For Land and Sea Demo v2.0, Silvus introduced the power of its latest 4x4 MIMO radio: the [SC4400](#).

SC4200



SC4400



### Features:

- 4 Watts TX power (8W effective thanks to 3dB beamforming boost)
- 2x2 MIMO
- Available in 3 form factors:
  - Externally powered "brick"
  - Battery powered handheld
  - Embeddable OEM

### Features:

- 8 Watts TX power (32W effective thanks to 6dB beamforming boost)
- 4x4 MIMO
- Available in 2 form factors:
  - Rugged
  - Embeddable OEM

StreamCaster radios were deployed **without** the aid of filters, amplifiers or tracking antennas. For this test, production COTS firmware version 3.14.0.2 was loaded in all radios. The network was deployed in the 2GHz "S Band", coordinated with local authorities on a non-interfering basis.

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The fixed sites utilized a combination of 12dBi sector antennas and 4dBi omni antennas, while the vehicles and boat were configured with 4dBi omni antennas. The vehicles traveled counter clockwise in a lead and chase pattern obeying all state and local traffic laws and regulations.





## Execution



As the vessel departed port, Silvus Founder Dr. Babak Daneshrad demonstrated the “Suppress and Avoid” Anti-Jam technologies currently under development in Silvus’s R&D labs. Case studies discussing these next-generation concepts are available upon request, by emailing [info@silvustechnologies.com](mailto:info@silvustechnologies.com).

Once the vessel reached the center of San Diego Bay, it loitered on station as the Land and Sea v2.0 demonstration began.

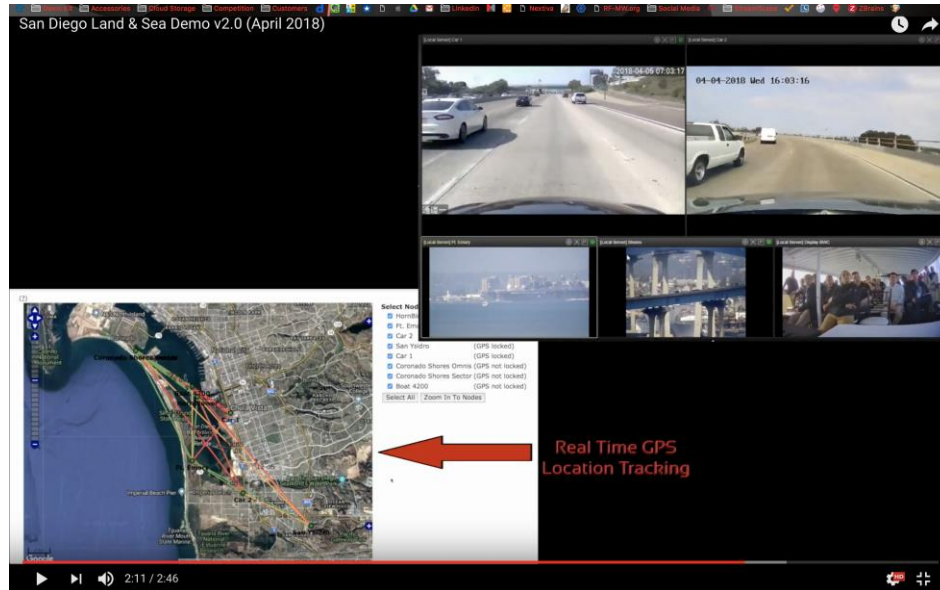
StreamCaster capabilities demonstrated:

- **HD Video** – 5 live camera feeds from the vehicles, remotely controlled Pan/Tilt/Zoom (PTZ) cameras, and local handheld w/ bodycam were aggregated by an Airship Video Management System (VMS) and displayed at the TOC
- **Mapping** – GPS pucks connected to each radio enabled the TOC to track node locations in real time.
  - **Using StreamScape** – the location of each radio is overlaid in Google Maps, along with signal strengths for each link in the network.
  - **Using WinTAK** – StreamScape exports GPS locations as Cursor on Target (CoT) messages, which were ingested into WinTAK for situational awareness.
- **Push-to-Talk Voice** – was used throughout the demo for vehicle-to-vehicle convoy communications and also vehicle-to-TOC for coordination and guidance.
- **Network Management** – The network was administered using the StreamScape GUI, embedded in each StreamCaster radio, providing real-time insight into link health, network traffic statistics, and RF interference levels.

## Results

A time lapse video of the Land and Sea Demo 2.0 is provided here:

<https://www.youtube.com/watch?v=SMFLLYkTx2k>



## Conclusion

As expected, link SNRs are observed to fluctuate as the vehicles traverse the complex urban coastal terrain. Thanks to dynamic link state routing and adaptive Modulation and Coding Schemes (MCS), voice and video quality remain solid and handoffs are seamless and transparent. With expedient antenna placement and minimal node count, Silvus was able to reliably support 5~10Mbps of network traffic throughout the AOR. The 8 Watt organic TX power of the SC4400s, through Eigen TX beamforming, delivered an effective radiated power of 32 Watts and met the mission requirements while operating on battery power for the entire day.

Silvus Technologies' commitment to deliver the latest multi-antenna and signal processing advancements to our users is evident in this test of our COTS offering. By leveraging the power of 4x4 MIMO in the StreamCaster SC4400, Silvus was able to demonstrate high bandwidth ad hoc connectivity at the tactical edge.

Silvus would like to thank the DoD user community, local San Diego 1<sup>st</sup> Responders and industry partners who attended the event as well as NAVSPECWARCOM N-6 and City of San Diego staff and contractors who assisted with access and resources.

If you or your organization is interested in more information about this or any other demonstration, or would like to set up a test of your own, please contact [info@silvustechnologies.com](mailto:info@silvustechnologies.com).