INTEGRATED SENSING AND COMMUNICATION (ISAC) BRINGS THE FUTURE TO LIFE IN 6G

Integrated sensing and communication (ISAC) is a pillar of 6G. Combining two different yet similar worlds – communications and environmental sensing – brings the future to life in the 6G era. The key ISAC drivers are beamforming with MIMO arrays, artificial intelligence (AI), modern modulation schemes and dense network infrastructure. The R&S®AREG800A automotive radar echo generator is a core element of a versatile research and development test solution in the ISAC community.

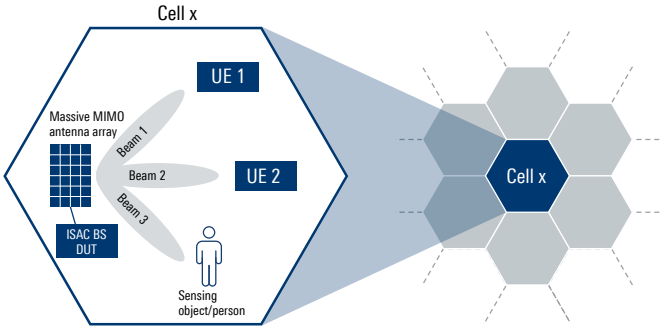
Your task

ISAC sensors must accurately sense the environment while also supporting communications in the same waveform. Along with classical applications such as communications or automotive safety, ISAC technology opens the door to new applications such as smart factories, health monitoring, smart traffic monitoring, intruder detection, privacy protection or target localization through accurate object location finding alongside the establishment of communications links. A new waveform must be designed for ISAC. Starting with coordinated signals where a radar-centric or a communication-centric development approach is possible, the true goal is a fully unified waveform that integrates both radar sensing and communications for the best possible solution.

Communications and the automotive radar may seem quite different at first, but upon a closer look these two technologies share common elements and form a solid foundation the implementing and adopting ISAC:

- Both technologies use beamforming
- Both technologies have phased antenna arrays
- Channel estimation in communications and object parameter estimation in radar
- Symbol detection in communications and object detection in radar

Typical example of a cell description (coverage area for a base station – ISAC BS)



Rohde&Schwarz solution

Rohde&Schwarz has reliable and repeatable test solutions that let the 6G community to grow and develop in the right direction. The R&S®AREG800A automotive radar echo generator can be combined with the R&S®FE44S external frontend for frequency conversion in the FR2 band. The measurement solution is suitable for generating artificial objects in the frequency band from 24 GHz to 44 GHz. Both R&S®FE44S are connected to the base instrument at a lower IF frequency.

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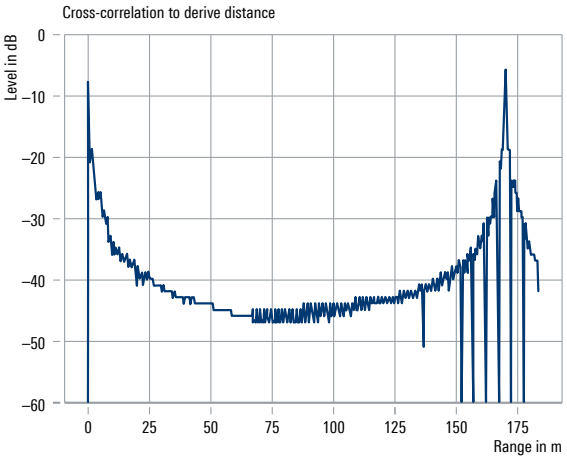
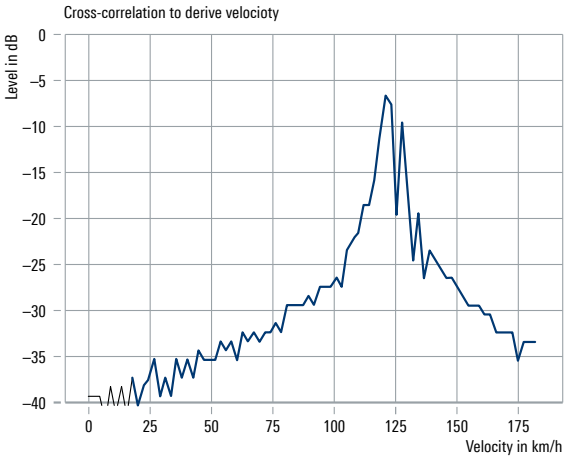
Make ideas real

Exemplary measurement with artificial object generated by R&S®AREG800A

Range



Speed



Frequency response and amplitude flatness in the front-ends are automatically compensated in R&S®AREG800A for optimum measurement results. If your ISAC prototype is not yet finalized, the R&S®SMW200A vector signal generator and the R&S®FSW85 signal and spectrum analyzer are a powerful combination when developing application-specific waveforms and signal processing algorithms. Once an ISAC FR2 DUT is ready, Rohde&Schwarz instruments can be used to perform conducted or over-the-air (OTA) tests.

Application

A fully equipped R&S®AREG800A can generate up to 32 artificial objects that are independent in range, Doppler effect and radar cross section (RCS). From the user perspective, the generated objects allow simulation of densely populated and realistic scenarios in line with the relevant requirements.

Summary

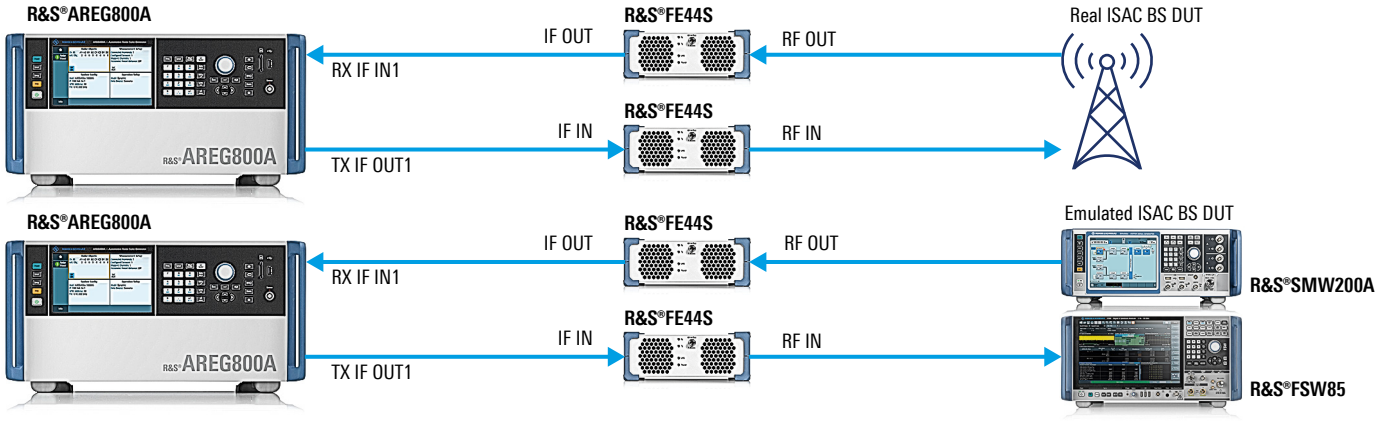
The key conclusions are as follows:

- ISAC is a pillar of 6G
- Innovative applications are shaping ISAC technology
- The award-winning all-in-one test solution from Rohde&Schwarz creates a reliable and repeatable test environment
- The setup uses external frontends to enable upconversion and downconversion directly at the DUT for better test setup performance at a lower cost

See also

https://www.rohde-schwarz.com/product/areg800a

ISAC test setup diagram



Designation	Type	Order No.
Automotive radar echo generator	R&S®AREG800A	1437.4400.02
Vector signal generator	R&S®SMW200	1412.0000.02
Signal and spectrum analyzer	R&S®FSW85	1331.5003.85
External frontend	R&S®FE44S	1338.7001.02

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Data without tolerance limits is not binding | Subject to change

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