

An abstract background image featuring concentric, swirling patterns of light in shades of teal and red, creating a tunnel-like effect that draws the eye towards the center.

## Sivers Insights

# IMS 2022 – Hot in Denver

*This year Denver in June was hot.* Not only because of the remarkable weather, with shining light from the sun and close to 90 degrees Fahrenheit, but also because the world's most prominent microwave engineers and communities gathered at this year's International Microwave Symposium in Denver to share insights and updates from a world, driven by innovation and future expectations. After a virtual version in Los Angeles back in 2020 and a "somewhat crippled" show in Atlanta last year, ambitions were set high in all aspects of both the conference as well as the exhibition.

The main new thing this year was the Systems Forum - a three day forum that brought together the latest proceedings in telecom, radar and space applications.

IMS well known for the comprehensive conference with several tracks addressing all possible microwave and millimeter wave technologies, from the more mature ones to the latest research findings. A revitalized exhibition with more than 435 exhibitors featured together with the MicroApps Theatre, the Systems Pavilion, Systems Demo Zone plus the networking and social events, all happening on the show floor meant a vibrant occasion where technology and innovation took the front seat.

This year, "everyone" was there. Or we should say that all relevant microwave and millimeter wave suppliers were there. Most of them with people in front of screens showing nice power points and graphics stating the excellence in different ways. Sivers approach this year was to show what can be done instead of only talking about it. Therefore, we had an ambitious approach to have multiple live demos running simultaneously in our booths. Yes, we had two booths, located just opposite of each other over the walkway, which was a great approach since all potential visitors, in practice, had to pass through our "demo area".

## A pent-up need to meet live and be able to share ideas and insights

During this year's IMS show, it was evident how much people have missed to meet and discuss "in real life". The Sivers team had a long list of pre-booked meetings with both customers, partners, analysts and other stakeholders within the eco-system and on top of that, there was a steady flow of spontaneous visitors with a great interest in our products and capabilities.

The main areas of interest in terms of where millimetre wave technology is used and will be used seems to be 5G systems with focus on capacity and latency; Satellite Communications, where the new LEO satellites creates a massive demand for communication to places where solid infrastructure cannot be found and Radar, where the need for advanced sensor technologies, like Image Radars, has a great opportunity in the IoT space. All of these application areas fit very good with the capabilities of Sivers, both in terms of products and available technology.

## Seeing is Believing

Sivers are true believers in showing instead of telling, which is why we put great effort in making the live demonstrations as attractive and inspiring as possible. In our two booths, we managed to demonstrate two different alternatives of 28 GHz 5G NR communication as well as an unlicensed 60 GHz multi-gigabit link.

### SUMMIT2629 in a 12x16 antenna array



**Figure 1.** Sivers staff showing the market leading SUMMIT2629 product in a 12x16 antenna array.

Sivers had a strategic position on the exhibition floor with two small stands across of each other on each side of the walkway, where we had live demos shooting 28 GHz traffic between the stands.

This demo showed an array of 12x16 antenna elements, fed by 12 BFICs (SUMMIT2629), which is an applicable configuration used by our customers as well as ourselves in our repeater PoC units that has been tested in the field with a 5G Operator. The unique power efficiency and linear power of the SUMMIT2629 adds true value to our customers, since it enable them to reach further with less power consumption, giving end users a superior user experience with better throughput and better quality.

### Airvine WaveTunnel™ with Sivers Inside

Following our theme of “At the Heart of Innovation”, we also used a live demo to show a live demo. This is possibly the first time in history, where a 60 GHz link was used to carry a live stream video from one booth in the far end of the exhibition hall to the Sivers booth.

By means of our partner Airvine’s new innovative WaveTunnel™ product, we managed to connect the Kreemo stand with the Sivers stand approximately 170 meters apart. The throughput and the technology in itself are impressive, but it was remarkable how easy it was to configure and set up the WaveTunnel product. This is obviously a “best practice reference” on how to make a millimeter wave deployment seamless and easy.

### Kreemo antennas fuelled by Sivers

The live stream showed the impressive Kreemo performance of a 360 degree mmWave antenna fuelled by the Sivers beamformer ICs (SUMMIT2629) and was displayed live in the Sivers booth. To prove the performance, the antenna was put on a rotating disc and an “over-the air-measurement” was performed to show the continuous performance throughout a 360 degree rotation. This was a nice way of killing the myth that mmWave is difficult to use in handsets and tablets.

Kreemo also showed their Antenna in Display solution, where they have integrated their transparent antenna technology into the display of a handset. Yet another technology leap that will open for new innovative use cases and applications of mmWave. Of course, also this antenna was fuelled by Sivers beam formers inside.



**Figure 2.** Airvine's WaveTunnel™ product transmitting a live stream video over 170 meters between Kreemo and Sivers booths.



**Figure 3.** The screen in the background showing the demo at the Kreemo booth with the rotating 360 degree antenna developed by Kreemo with Sivers beamformers inside.



**Figure 4.** Kreemo transparent antenna technology applied as Antenna in Display with Sivers technology behind the scenes.



### Higher level of integration means less complexity and less headache

The fourth live demo that was performed by Sivers was the demonstration of the highly integrated transceiver IC for 28 GHz (TRB02801). This was the first time, we showed this live outside the lab environment and we showed a market leading performance with respect to phase noise and linearity, two truly critical parameters in any 5G NR system with the ambition to provide higher data speed. To reach the quite tough requirements set by the 5G NR specification to support higher modulation schemes, it is normally required to use external synthesizers and PLLs, which can be a substantial cost in the total Bill of Material for a 5G NR transceiver. With the Sivers TRB02801 and TRB03901, the integrated synthesizer and PLL, gives the required performance without the need for expensive external synthesizers. Besides the cost, a solution based on Sivers TRB products will be far less complex than any available alternative as Sivers already took the headache out of the system integration on these higher frequencies.



**Figure 5.** Live demonstration of a mmWave transceiver with the highest integration level on the market combined with compelling performance.

### A Strong Position Moving Forward

The feeling and perception after spending a few intense days at the world's leading microwave and millimetre wave event is that Sivers is very well positioned to take on the challenges lying ahead. The combined strength of the former Sivers Wireless team and the former Mixcomm team became evident during this show and the combined portfolio of "The new Sivers Wireless" is competitive and compelling in the eyes of our customers and partners.

This was also highlighted by Pat Hindle, Editor at the respected Microwave Journal, who wrote the following in his review of the IMS Show:

<https://www.microwavejournal.com/blogs/9-pat-hindle-mwj-editor/post/38452-ims-2022-highlights>

#### IMS 2022 Highlights by Pat Hindle

IMS 2022 was close to back to normal with about 6500 total attendees and 450 exhibiting companies in Denver – a great sight to see. The mood was very energetic, and everyone was very happy to see each other since it was close to two years since many had been together. As 5G and SATCOM continue to be areas of growth, it is good to see some new emerging markets like 6G, quantum and hypersonics gaining momentum.

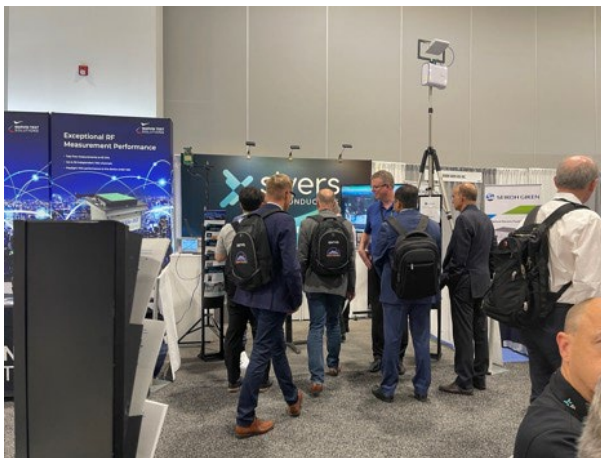
5G mmWave rollouts have not taken off as fast as expected but now seem to be rolling out at a greater pace. Companies I saw leading 5G mmWave market were:

- Anokiwave – on their 4th generation of products and think they have the most flexible and robust chip set.
- Sivers/Mixcomm – have the broadest portfolio of products covering all licensed and unlicensed mmWave bands
- Analog Devices – only company offering the full signal chain mmWave platform
- Qorvo – using GaN front ends for maximum output power and efficiency

The most interesting things I saw were a transparent antenna-on-display solution and the emergence of RF Glass. KREEMO and Sivers Semiconductors announced that they have successfully demonstrated data communication between transparent antenna-on-display devices based on **SUMMIT2629**, a 28 GHz beamforming chip, and stackable patch antenna devices with 360-degree beam coverage. The SUMMIT 2629 is a RFSOI eight-channel RF beamforming IC for 28 GHz and extends link range and reduces power consumption while optimizing antenna array complexity.

KREEMO has the first transparent antenna-on-display technology that implements mmWave antennas on displays and stackable patch antenna technology that provides 360-degree coverage. The products jointly developed and supplied by KREEMO and Sivers Semiconductors are the transparent antenna-on-display module, the 1x4 stackable patch antenna module with a 360-degree beam coverage, a 4x4 AiP module (scheduled in 4Q), a 4 x 4 stackable patch antenna module with a 360-degree coverage (scheduled in '23 2Q) and the antenna development kit 360° (ADK360°). **This is a very interesting technology and development.**

So, with those nice words, we can conclude that our journey has merely started and we look forward to fuel the growth of millimetre wave solutions in 5G, SatCom and Radar applications moving forward.



**Figur 6.** A snapshot of activities in the Sivers booth.

**Anders Storm**  
 Group CEO  
 Sivers Semiconductors