ALCAN

The Future of Smart Antennas

Series B (EUR 15 M)

Investor Summary (Q2 2021)

"We provide anytime anywhere connectivity via satellite and 5G by combining Liquid Crystal Technology with Phased Array Technology"

ALCAN

COMPANY PROFILE ALCAN Systems

Startup: Focus on development and marketing of smart flat panel antennas

Spin-off: From Technical University of Darmstadt in 2017

Award-winning: 5 prizes

Number of Employees: 35

Locations: Darmstadt (HQ) and Istanbul

Funding to date: € 18 M received

Technology: Phased Array and Liquid Crystal (LC)

Production: LCD Technology

Markets served

SatCom: Enterprise, Consumer, Landmobile

5G: Consumer, Landmobile

IP: 20+ patents

We are raising Series B funding of **€15 M** to support **2 years** of growth and to release satellite products

TEAM OF INDUSTRY EXPERTS drives ALCAN's business

Dr. Onur H. Karabey

Co-Founder
Chief Executive Officer

- ALCAN has initiated from Onur's Ph.D. studies
- Over 9 years of leadership experience
- Over 12 years of Microwave Engineer experience
- Co-inventor of 6 patents
- Holds 5 Prize related to his liquid crystal research

Dr. A. Burak Olcen

Co-Founder
Chief Product Officer

- Leads product development
- Over 19 years of product development and management engineer experience
- Co-inventor of 12 patents
- Serial entrepreneurship activities

Dr. Ahmed Akgiray

Chief Technology Officer
GM of Turkey Office

- Leads technology development
- Over 14 years of RF engineering experience
- Ex-NASA employee, designed Mars Rover's landing radar
- Co-inventor of 4 patents

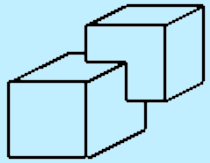
Christian Fleischhauer

Chief Financial Officer

- CFA Charterholder
- 15 years of asset management, financial modeling and M&A experience for private equity firms
- Managing director & Co-Owner of Media Broadcast Satellite GmbH (MBS) since 2015
- Studied business law at BELS

ALCAN'S INVESTORS deliver key strategic buy-in across the value chain

To date, ALCAN's investor base consists of key strategic partners and industry leaders

FINANCIAL INVESTOR	SUPPLY CHAIN INVESTORS*	SALES & DISTRIBUTION INVESTORS*
 CSS Owned by Prof. Thomas Weiland, the Chairman of ALCAN's Supervisory Board	MERCK World largest supplier of Liquid Crystal (LC)	SES beyond frontiers The world's largest satellite operator and
	BOE Leading Liquid Crystal Display (LCD) manufacturer	MBS A global provider for satellite and terrestrial solutions

*No procurement or sales exclusivity is granted for Supply Chain and Sales & Distribution investors. We are happy to offer introductions to our strategic supply chain partners upon request.

CONNECTIVITY is undergoing evolutionary change in the decade ahead. ALCAN will play a key role

Connectivity technologies are taking strides forward

	CONNECTIVITY SPECTRUM	VALUE PROPOSITION CONSUMER
Advanced	Wi-Fi 6	Next generation Wi-Fi with improved speed, device density and features to increase device efficiency
	Low-to-mid band 5G	High speed, low latency, cellular connectivity on existing 4G infrastructure
Frontier	LEO constellation	Global coverage with significantly reduced latency vs. existing satellite offerings
	High-band 5G (ie. millimeter wave)	Highest speed, low latency and highly secure cellular connectivity

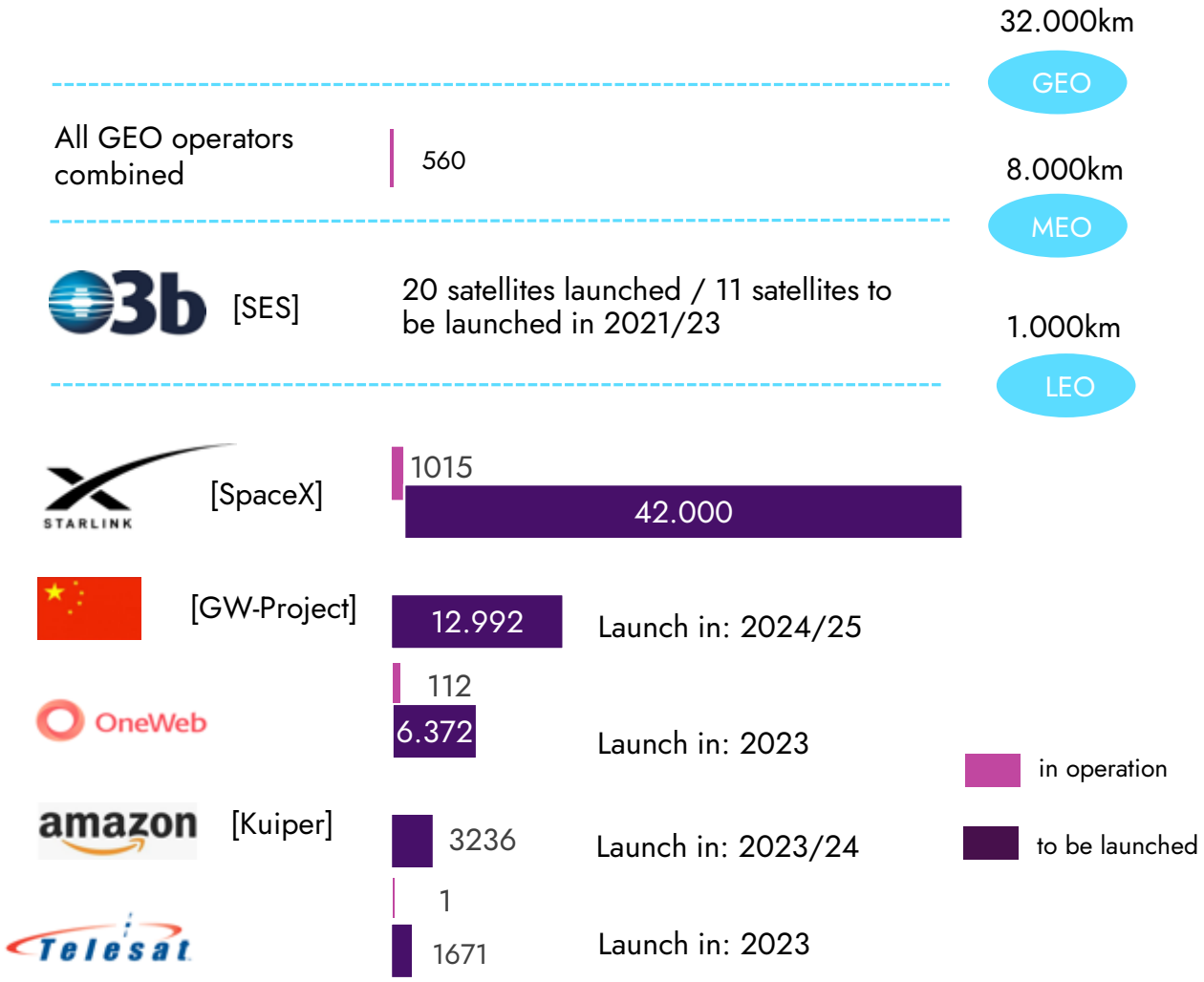
The investment outlay in Connectivity Technology is fuelled by:

- **Rising Demand** in **data consumption**
- User requirement to **consume data "Anywhere and Anytime"** to affordable rates

Frontier Technology is emerging

To scale Frontier Connectivity to a consumer level, **current ground infrastructure cannot meet** the technical and economic **demands – ALCAN is going to change this!**

A NEW AGE OF SATELLITE GOLD RUSH has started to fill our connectivity needs



- A **new generation** of **satellite constellation** providers have started to fill the **strong demand for bandwidth** and solve the **latency** issue.
- Their **goal:** to provide **global connectivity** and to **disrupt** the **current standard of communication.**
- These players use the so-called Low Earth Orbit (LEO) instead of the traditional satellites.
- **Starlink** has already launched **1.000 satellites** and started their beta operations in 2020. In addition, they have ordered
  1 million antenna units. Others will follow in the next two years.

THE UNMET NEED

"The big obstacle: Satellite and ground-segment costs

To unlock the consumer market—the one with the most potential — **the cost of Electronically Steered Antennas (ESAs) antennas must drop by an order of magnitude or more.** While some companies have recently claimed breakthrough reductions in manufacturing costs, none has yet brought a low-cost design to market, nor have any produced ESAs at scale."

McKinsey & Company

Source: Large LEO satellite constellations: Will it be different this time? (May 2020)

HOWEVER, THERE IS ONE BIG CHALLENGE...
affordable ground equipment

Two main problems are already solved, but the key part is still missing

CONSTELLATION FUNDING
FAVOURABLE INVESTMENT ENVIRONMENT ✓

- SpaceX raised more than $ 3 bn in funding to date
- New satellite constellation are **highly subsidised** in the US/ CA; eg Telesat has received investments and **upfront commitment** from the Canadian government to provide rural internet services

MANUFACTURING & LAUNCH
SIGNIFICANT COST REDUCTIONS ✓

- Satellites have been traditionally more handcrafted. This has changed to **mass production**.
- Cost went down from USD/kg 50.000 to 60.000 to USD/kg 3.500
- **Reusability** and smaller satellites (higher pay) reduces the launch costs.

GROUND EQUIPMENT
BOTTLENECK TO PROFITABILITY

- Experts think SpaceX is **subsidising potentially thousands of dollars'** worth of hardware for each user (end-price is USD 499) to be competitive with other broadband solutions

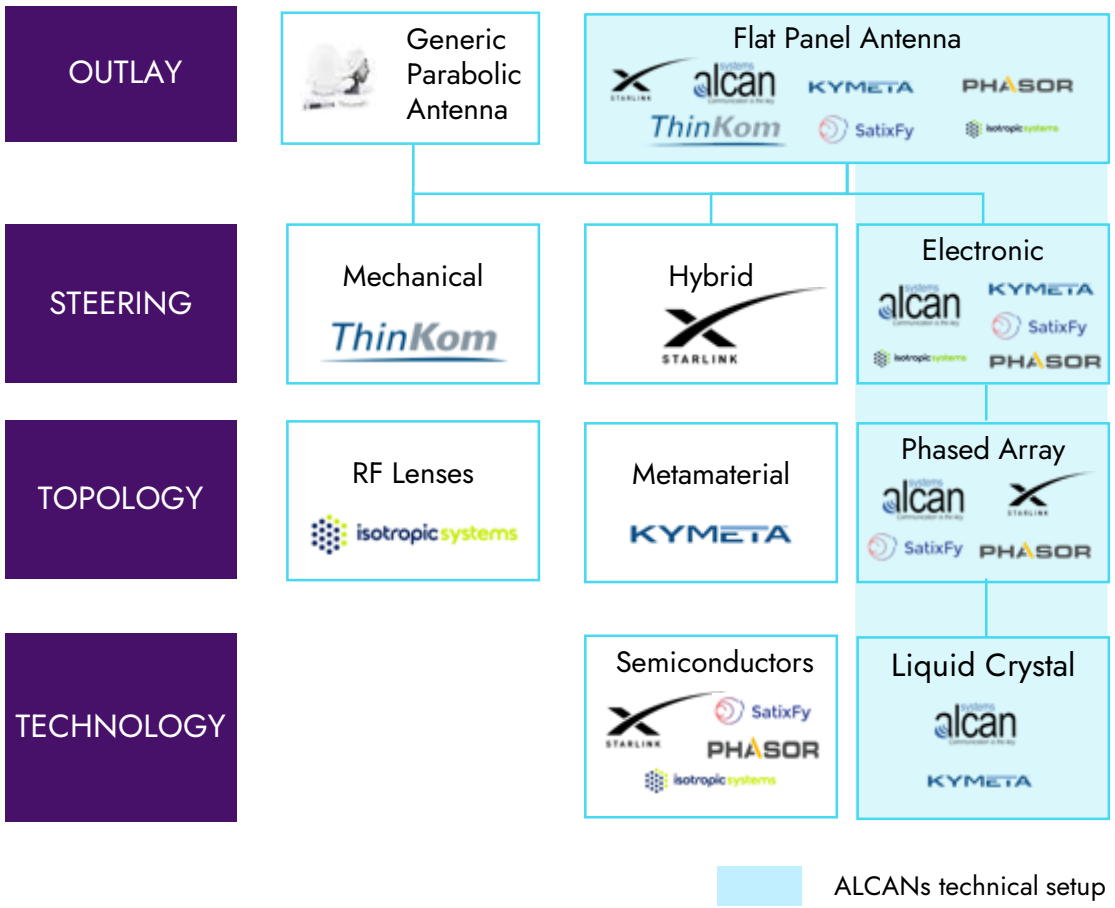
"I think the biggest challenge will be with the user terminal, and getting the **user terminal cost to be ... affordable**"

Elon Musk

STARLINK

LEVERAGING MATURE LCD MANUFACTURING,
ALCAN's technology provides 30x better power efficiency at 100x lower cost

Smart Antenna Components Setup



Technology Comparison

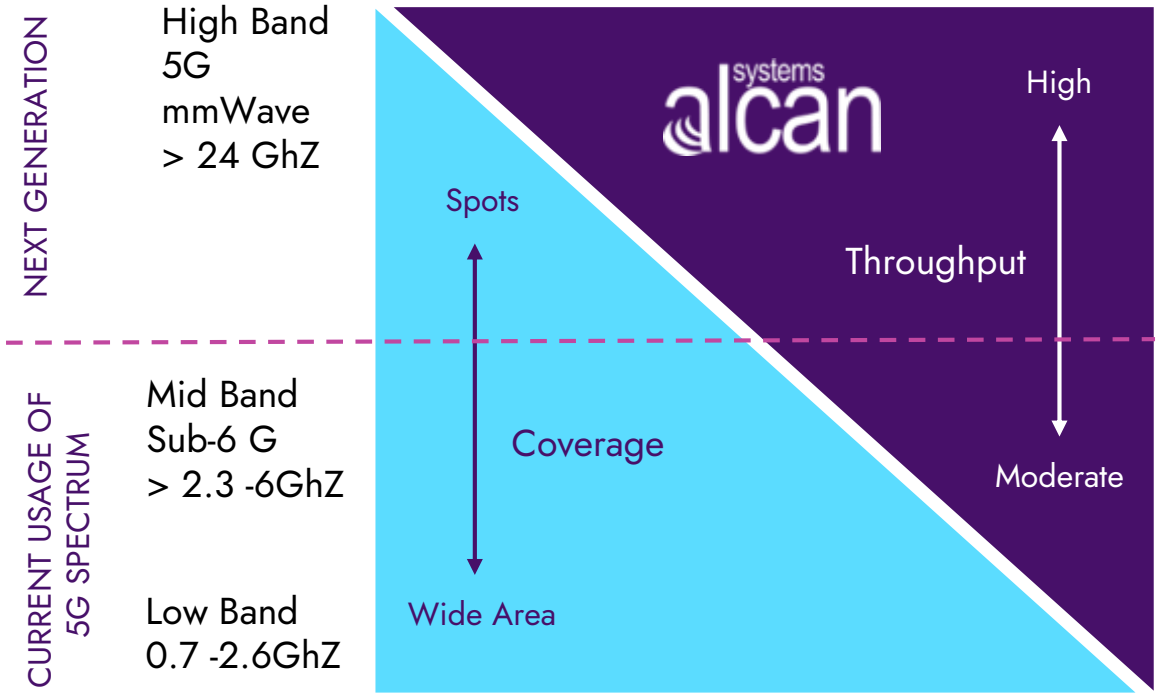
- **Parabolic antenna** are a **legacy technology**, with poor form factor, mechanical issues and limited use for new customer needs
- **Flat panels** have **no moving parts**, which yields **low maintenance costs**, a long life-time, and attractive form factors.

- **Electronic steering** enables **uninterrupted tracking** leading to **reliable services**, and **reduced** mechanical **degradation**

- Metamaterial and **phased array** are the most **mature technologies** for beam steering.
- Phased array technology offers **higher throughput** compared to Metamaterial

- Compared to Semiconductor-based Phased Arrays, Liquid Crystal Technology provides up to **30x lower power consumption** and **up to 100x lower production costs**, leveraging mature LC display TV production capacity for **economies of scale**

5G MILLIMETER WAVE (mmWave) requires low cost smart antennas



- There is a trade of between throughput and coverage
- High throughput can be achieved at **5G mmWave frequencies** (> 24 GHz)
- On the other hand, data transmitted in high frequencies have a higher path loss which leads to a **lower coverage range**
- A **focused beam** antenna can increase the coverage. However, it needs **beam steering capability** to scan landscape

Normal beam Focused beam

OUR INNOVATIVE PRODUCT is the combination of phased array and liquid crystal technologies

PHASED ARRAY TECHNOLOGY

- The most mature flat panel antenna approach is phased array and used since 1940s
- The technology is **proven but expensive**
- **Today's applications** are in **radar systems**

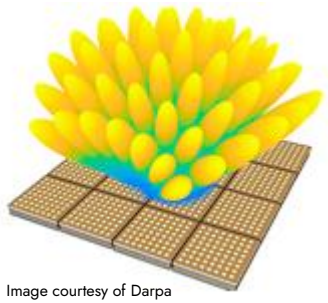
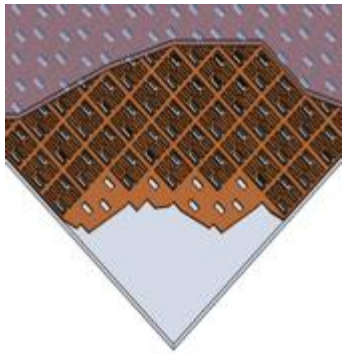


Image courtesy of Darpa

LIQUID CRYSTAL TECHNOLOGY

- Liquid crystals (LCs) has properties between those of conventional liquids and those of solid crystals.
- **Today, LC** finds a wide **use in liquid crystal displays LCD** within electronic products
- Standardized mass product

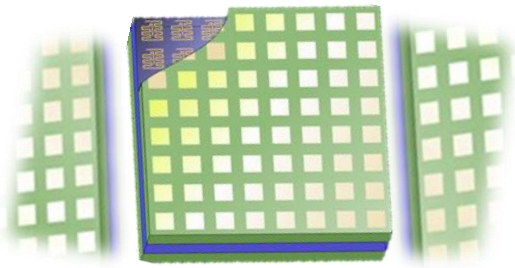


COMBINATION OF THESE TWO IS ALCAN'S INNOVATION

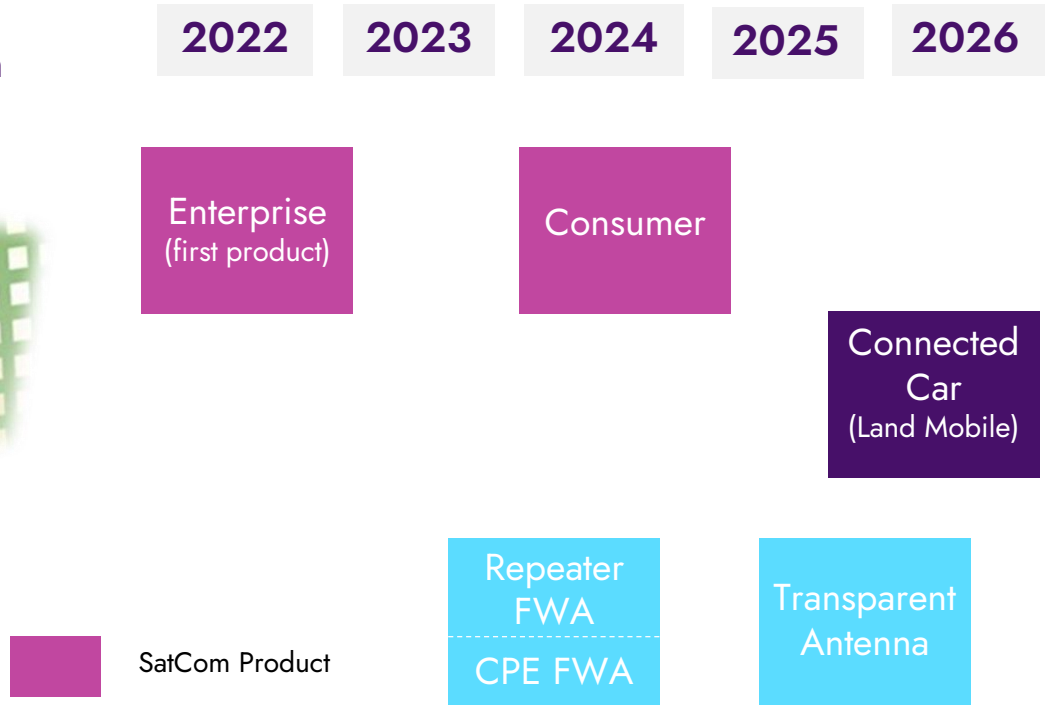
- Alcan's phased array antenna **technology** can **scale** to meet product specifications for consumer markets by **combining technologies** from two **legacy industries**.
- As a **platform technology**, Alcan's antennas can **serve both SatComm** and **5GmmWave** markets, with respective **CAGRS of 72%** and **31%** (2026-2030yrs)

ALCAN'S PLATFORM TECHNOLOGY and its derivatives will address SatCom and 5GmmWave in different vertical markets

ONE Platform Technology for 5GmmWave & SatCom



PRODUCT RUN-RATE



FWA = Fixed Wireless Access
CPE = Customer Premises Equipment

Focus on the low hanging fruits first.

- Among the new LEO operators, ALCAN is **following** their **target markets**. Everyone will be racing to gain market share since they are all starting at the same time.
- The **Enterprise and Consumer markets** have the **lowest entry barriers** and can **scale up** very quickly.
- Transparent and Connected Car Antennas will be the next big innovation drivers.

OUR ANTENNA SOLUTION will enable connected car due to its compatibility with both satellite and 5G infrastructures

ALCAN's Hybrid Vision: seamless switching between 5G and Satellite for 250+Mbs connectivity

WirtschaftsWoche

STARLINK-KOOPERATION MÖGLICH

VW will Autos über Satellit vernetzen – deutsches Raumfahrtkonsortium geplant

EXKLUSIV

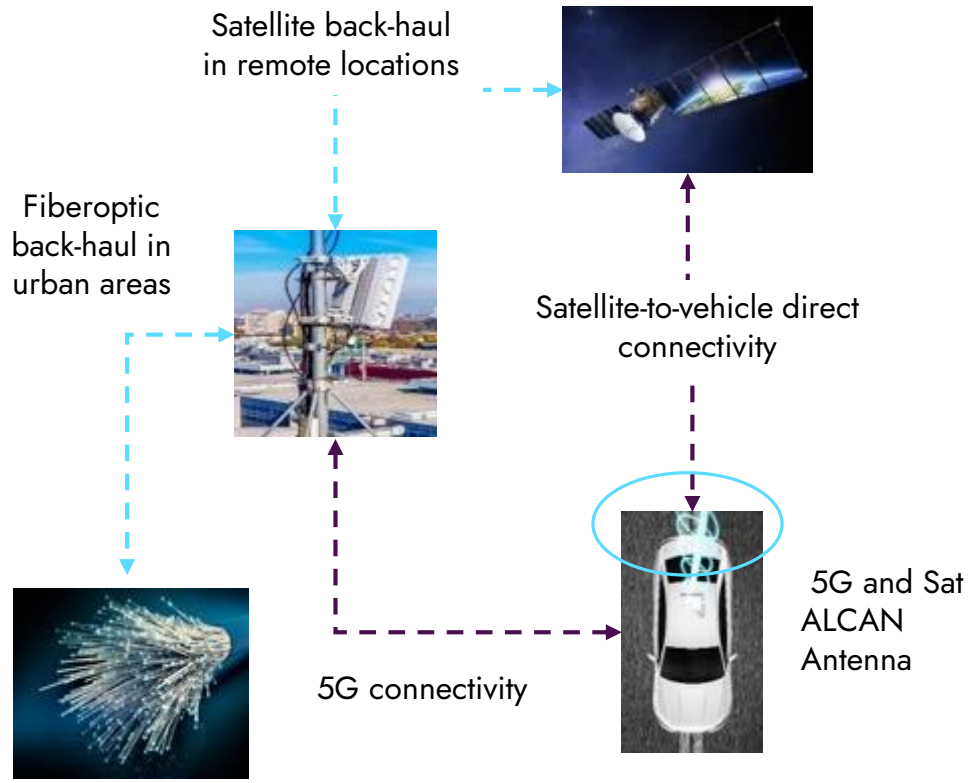
von Martin Selwert und Thomas Stölzel

Business Week: VW will connect cars by satellite

Inside the article:

The technology for reception in the car could come from the start-up Alcan Systems in Darmstadt [...]. Alcan has developed satellite antennas that can be integrated into the roof or trunk lid of the car.

„ALCAN INSIDE" USE CASE CONNECTED CAR



IN THE FUTURE ALCAN's antennas will be transparent and integrated into various devices

Antennas which are transparent and blended into the building / vehicle / device will serve a greater attraction with distinct advantages.

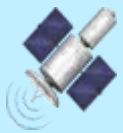
Window integrated

Sun-roof integrated antenna

Device Screen integrated

THE TOTAL ADDRESSABLE ANTENNA MARKET for ALCAN, is expected to grow from EUR 6 billion to EUR 35 billion between 2026 and 2031

Addressing multiple verticals worth almost € 35Bn

MARKETS	GROWTH DRIVERS ANTENNA MARKET	2026 MARKET	2031 MARKET
Satcom 	• The launch of new LEO satellites constellations will trigger a high demand for antennas • The market will eventually move from GEO to LEO/ MEO • Approximately, 3.6 Billion people are waiting for affordable internet connection	**€ 1.0 Bn**	**€ 15.0 Bn** CAGR=72% (yr 2026-30)
5G mmWave 	• A demand for mobility will increase data consumption • An increasing demand of high-volume data transmission in crowded and dense areas • Worldwide allocation of 5G mmWave spectrum • Both self-driving and connected cars need affordable internet connection	**€ 4.7 Bn**	**€ 18.1 Bn** CAGR= 31% (yr 2026-30)

SATCOM-antenna market is calculated based on industrial reports such as NSR, launch initiatives of satellite operators, excluding KU-band and closed ecosystems like Starlink and price reduction to USD 500 in 2031; 5G market is based on Ericsson report

WE HAVE THE SOLUTION to develop low-cost and high-performance antennas for 5G and SATCOM market

Peer Competitor Comparison

	ADDRESSABLE MARKET	PRODUCT AVAILABILITY	COMMENT
alcan systems	GEO/ MEO/LEO 5GmmWave	2022	Only company focussing on both markets
Generic Parabolic Antenna	only GEO	Legacy	Mechanical tracking, very complex design
KYMETA	GEO/ MEO/LEO	2018	Only smart antenna currently available: but bandwidth limitations
STARLINK	GEO/ MEO/LEO	2020	Closed environment; 499 USD antenna is heavily subsidised
isotropic systems	GEO/ MEO/LEO	2022	Semiconductors; Targets Aero and Government
SatixFy	GEO/ MEO/LEO	2022	Semiconductors; Targets Aero and Government

Comparison from an End User Perspective

*considering cost-base without considering cross-subsidies between service and antenna

WE DE-RISKED THE MOST CRITICAL PARTS of the technology and demonstrated key features with strategic partners

Key milestones of the past year

SATCOM

Electronic Beam Steering
- Demonstration of 2D scan
- Rx performance proven

LEO Tracking DEMO
- Tracking accuracy
- First tracking at Ka-band

Two-way Communication DEMO
- Transmit and receive at Ka-band
- High beam pointing while continuous steering
- Antenna's co- and cross polarization patterns are approved by the operator;
- Very low power consumption

Partners KLEO iridium connected

Partners SES MERCK TELESAT OneWave COMTECH

Q I 2020 — Q II — Q III — Q IV 2020

5GMM WAVE

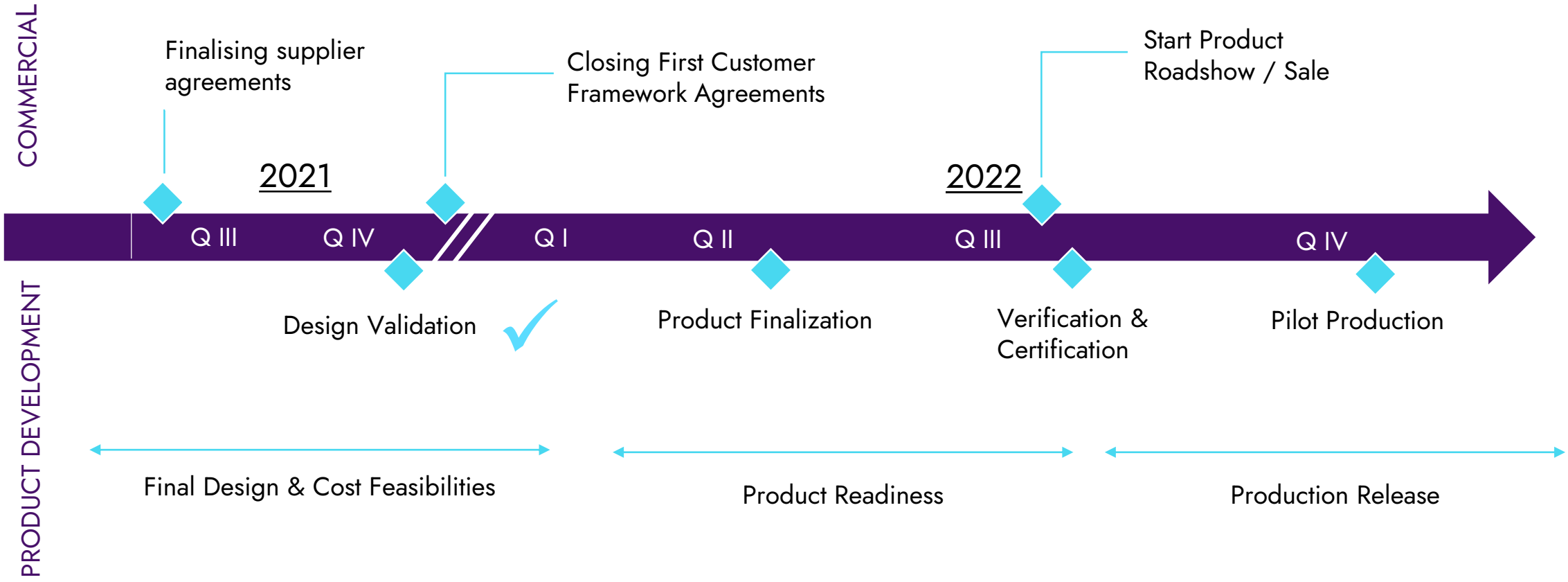
mmWave 5G Repeater DEMO
- First 5G Demo
- Dual beam (Receive and Transmit) in one aperture

mmWave 5G CPE DEMO
- Wide electronic beam steering
- Low power consumption demonstrated

Connected Car DEMO with OEM
- The first to build a car demo with ALCAN's antenna
- The antenna is seamlessly integrated into the car sunroof

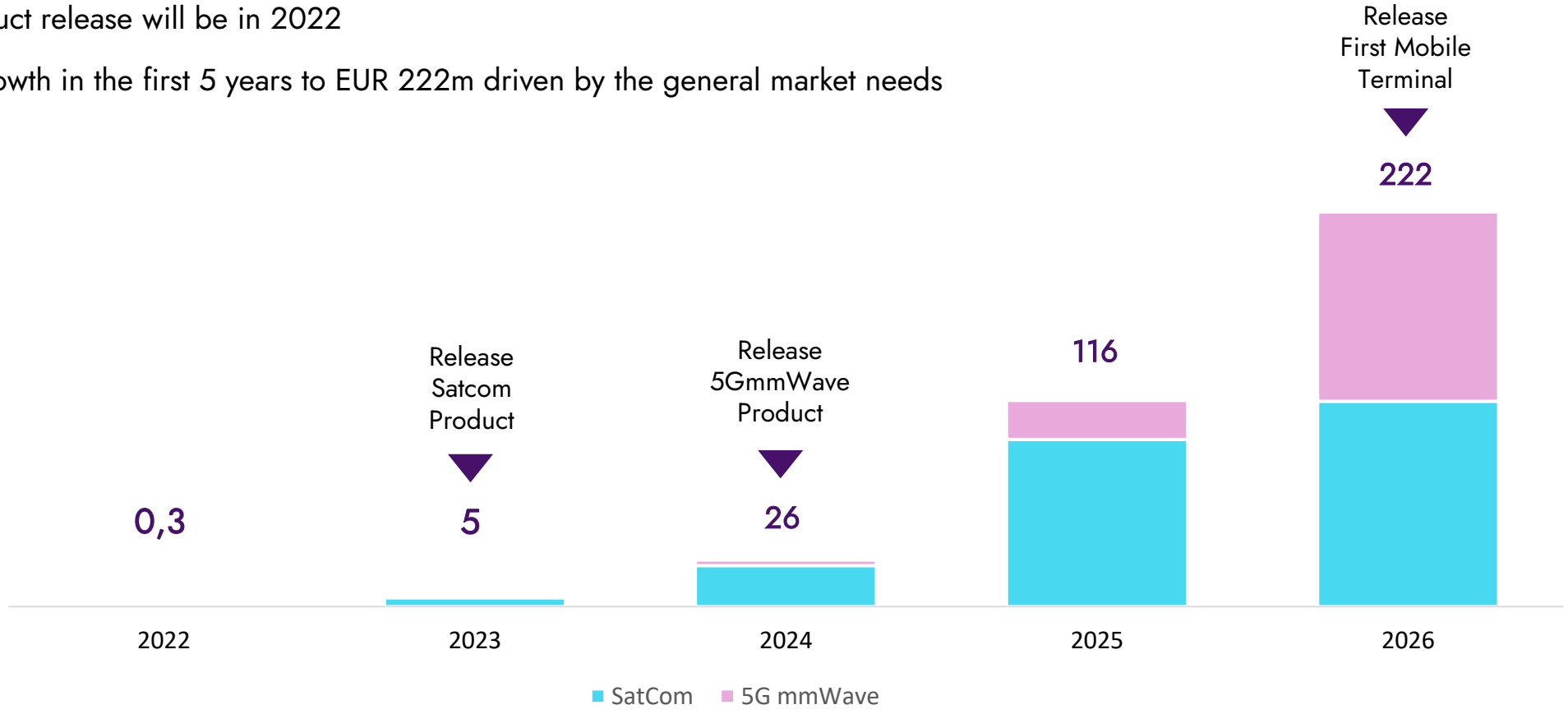
SERIES B IS RAISED to start the production of the SatCom product and finalize product design of the 5G product

What is going to happen in the next 12 months on the SatCom side



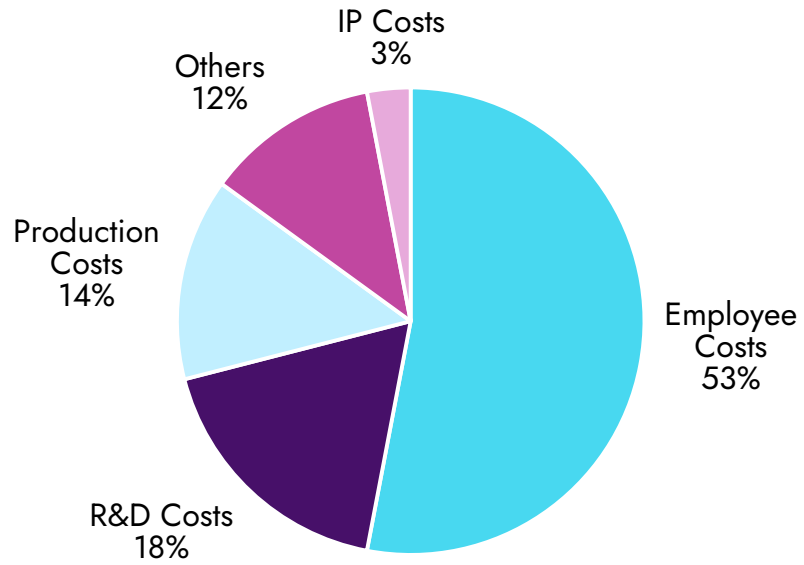
REVENUE SNAPSHOT in the first five years (in MEUR)

- First product release will be in 2022
- Strong growth in the first 5 years to EUR 222m driven by the general market needs



FUNDING STATUS

- Our target is to complete **€ 15 M** funding by **autumn 2021**
  - It will provide a **runway** for **24 months**
  - The funds will be used to launch the **first product** by Q4/2022: **Ka-band Enterprise FPA**
  - The team will **grow from 35 to 50 people, in:**
    - Sales & Marketing
    - Business Development
    - Production
    - R&D
- **€ 1 M has been received as a Convertible Loan**
- **€ 3 M grant will be received through European Space Agency (ESA) 4S Project**
- By October 2021, we expect to close the **remaining EUR 11 M** with a new lead investor



Use of funds

THANK YOU VERY MUCH!

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