



Introducing - LightSpeed Wireless™

PIONEERING DECENTRALIZED INTERNET INFRASTRUCTURE

OptiPulse's patent pending technology provides affordable direct-to-consumer broadband at never before seen wireless speeds, to all corners of the world.

- **Mission:** To use the disruptive capabilities of our technology, by building a much higher speed infrastructure, *to deliver access to as many under-connected people as possible* while making the common network stronger and faster.
- **Situation:** Early prototypes and chip modules have been completed and sold to strategic entities. *Next generation prototype, Prototype 3, in final assembly and testing.*
- **Attribute:** OptiPulse Light Grid *“deformable fields” can send very high speed light pulses over distance* to discrete locations with or without the use of mechanical devices; by altering the pulse mode, it can illuminate to sense 3D objects at an incredible resolution.
- **Global Benefit:** Decentralize and distribute commercial potential to the public through *expanded and enhanced tele-medicine, tele-education, job training, and IoT applications.*
- **Rollout Benefit:** Re-invest some of the expected quick growth revenue into *expanding access for underdeveloped regions locally and across the globe*

LightSpeed Wireless™ will Change Communications

Why We are Here in Front of You Now

- **Awareness:** OptiPulse LightSpeed Wireless™ is not just a product, *through our value-based approach it is an enabler benefiting your constituents and their community.*
- **Deployment:** Each of your communities has immediate needs (schools, libraries, clinics, community centers, businesses) and those that can facilitate rapid deployment (investors, community planners, ISPs, electricity Co-ops). *Build a plan with us.*
- **Prioritize:** Manufacturing and assembly in New Mexico will require funding for facilities, equipment, job training, and inventory; *to capture this 5G broadband opportunity for New Mexico requires prioritizing this funding.*
- **Legislation:** *Strengthen local community, electric Co-ops, and ISPs rights* to decide how to manage their community's infrastructure.
- **Support:** Work with OptiPulse *to gain access to programs* under NMFA, IRBs, Business Loans, ACCION, the Loan Fund, and the many others.
- **Multiplier:** Broadband is *a significant multiplier for economic development*, our technology can bring it into all the dusty corners of New Mexico.

Build a Manufacturing Base & Tech Training Statewide

- **5G is Coming:** it is necessary, *demand already out paces 4G*, the USA is already behind several other major economies in the world!
- **What is 5G:** “G” stands for Generation, *5G brings greater speed* (to move more data), *lower latency* (to be more responsive), *and the ability to connect a lot more devices at once* (for sensors and smart devices).
 - 1G was Analog,
 - 2G was 1st digital (CDMA, GSM...),
 - 3G moved digital from Kbps to Mbps,
 - 4G is incompatible with 3G, moved speeds up to Gbps (LTE, WiMAX..)
- **5G Wireless:** possible in only two ways, OptiPulse LightSpeed Wireless™ and mmWave wireless. *OptiPulse, a New Mexico company, has a very low CSWOT Photonics technology*, whereas mmWave is more expensive per device, with health concerns
- **5G Devices:** to meet demand will require a huge manufacturing base, Ericsson forecast that IoT devices *will grow by 5 times* from 700 million in June 2018 to 3.5 billion in 2023
- **Opportunity:** building a 5G infrastructure will make New Mexico immediately attractive to Industrial Automation, autonomous vehicle, IoT companies; *leapfrog nation by supporting a 5G network in New Mexico*

Working Together, New Mexico can be a 5G 1st Mover



President, Founder, and Inventor - John Joseph has written over 12 major concept issued patents, more pending, on VCSEL array architecture that “optically sum coherent beams into an incoherent light source that exhibits the unique ability to shape the summed beams into Light “fields” (as in FOV -Field of View). Instrumental in the early design and development of VCSEL technology, he has 30+ yrs. of experience in VCSEL processing, quality control and facilities. See Bio on Page 31.



CEO, Co-Founder, and Investor - Mathis Shinnick, has extensive experience in C level Management in Start-ups, Mid Market and Large Corporates living and working around the globe as CEO and Managing Director incl: Chase’s Aerospace and Defense business, a Merchant Banking business based in Hamburg, Germany, and as founder of numerous financial and corporate start-ups. See Bio on Page 32.



CTO, Co-Founder - Dr. Jim Lott is world renowned for his record breaking epitaxial wafer designs with high speed and efficient data transfer with VCSEL (Vertical Cavity Surface Emitting) Jim’s team is about to announce a world record high power and high speed device which is using OptiPulse epitaxial wafers



Chief Blockchain Architect - Dr. Feng Hou, CIO of CNM and an award winning leader in blockchain development, has moved CNM into one of a few globally recognized leaders in Blockchain education. Invited to the White House recently to participate in the 2018 State-Federal STEM Education Summit, he brings to OptiPulse leadership and commitment to using Blockchain as a tool for building useful applications that benefit the public.

Core Competencies Provided by Dedicated Team



John Joseph
VCSEL Array & Processing Design



Mathis Shinnick
Fund Raising & Investment



Jim Lott
Wafer Design & Growth



Feng Hou
Blockchain Architect



Payman Zarkesh-Ha
Detector & Emitter Drivers



Robert Frank
Board Governance



Patrick Collier
Product Development



Anne Kain
Financing & Risk



Darrell Garcia
People Resources



Gil Gonzales
Network Systems



Bill Szaroletta
Innovation



Tim Pressnall
Engineering



Anne Edstrom
Marketing



Alex Joseph
Database & IT



Danny Tindell
Assembly



Eric Gieryng
Receiving & Inventory

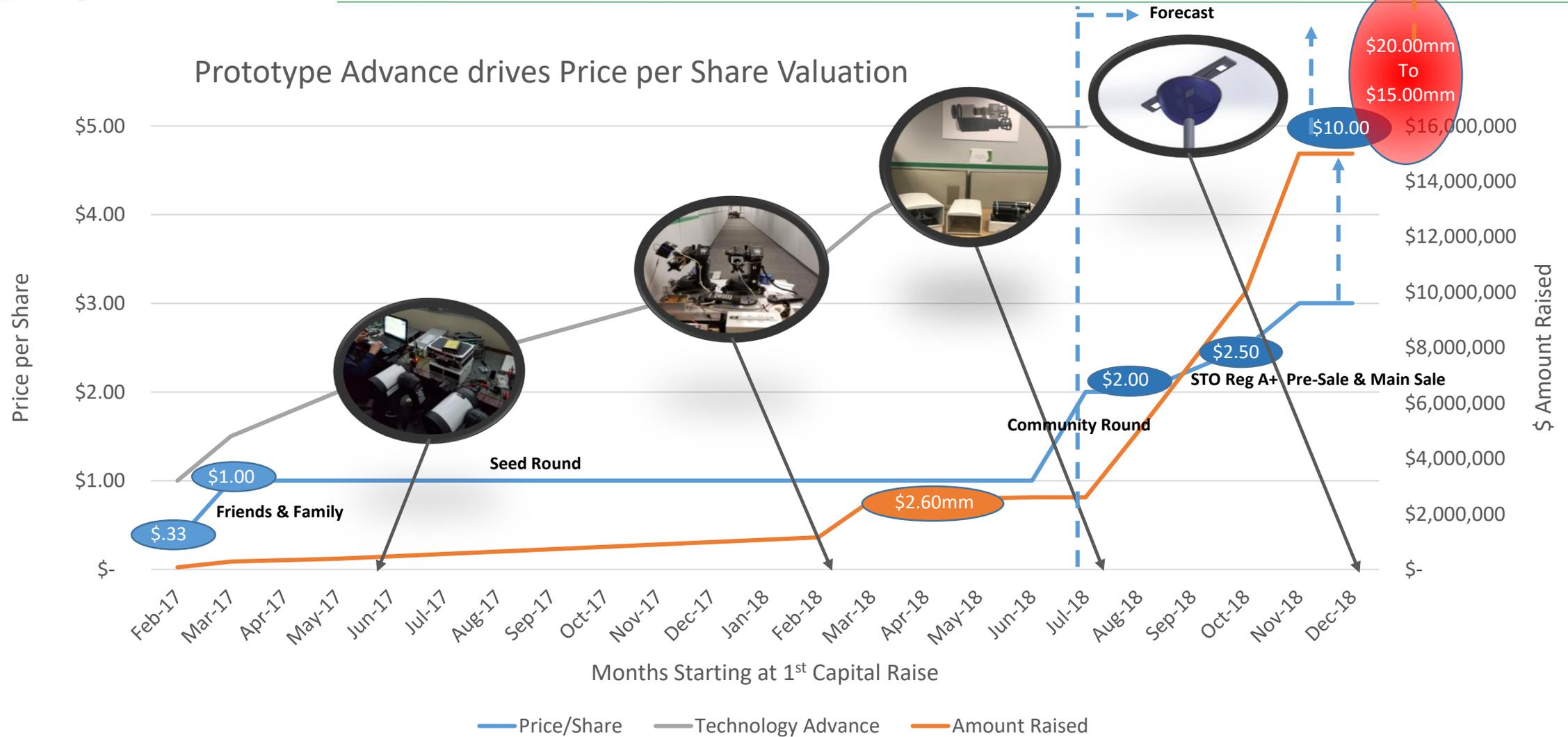


Anna Kuuttilla
Patents

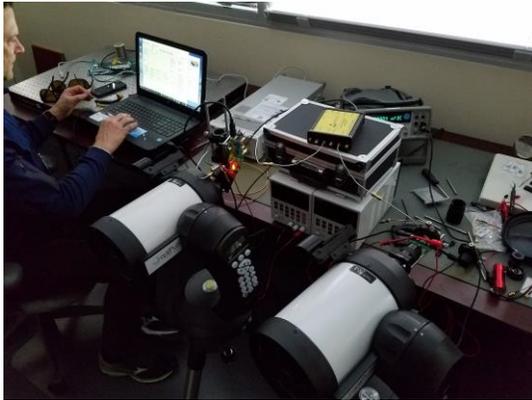


Colin
Installation

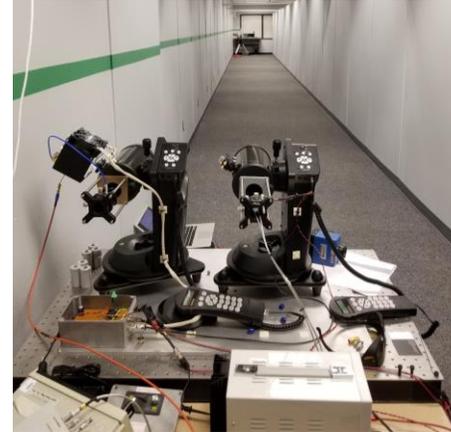
Advancing Technology and Funding



Development of Prototypes, Focus on Near Term Goal

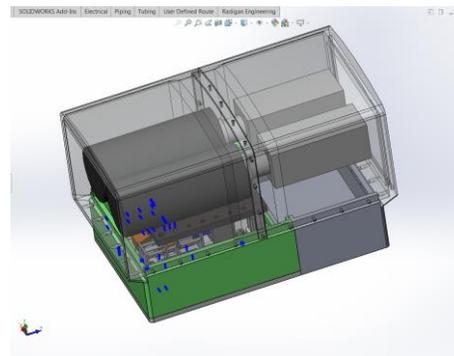
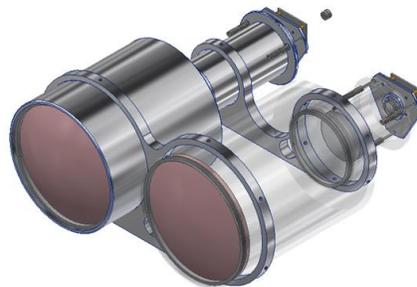
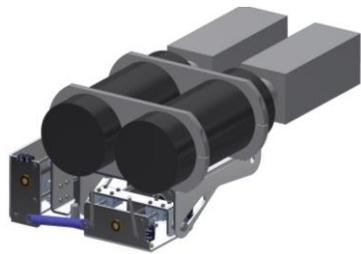


Prototype 1 – A 100m 10Gbps Single Channel Optical Wireless Simplex - Demo Delivered to Fortune 500 customer May 2017 for ~\$250,000 in Revenue



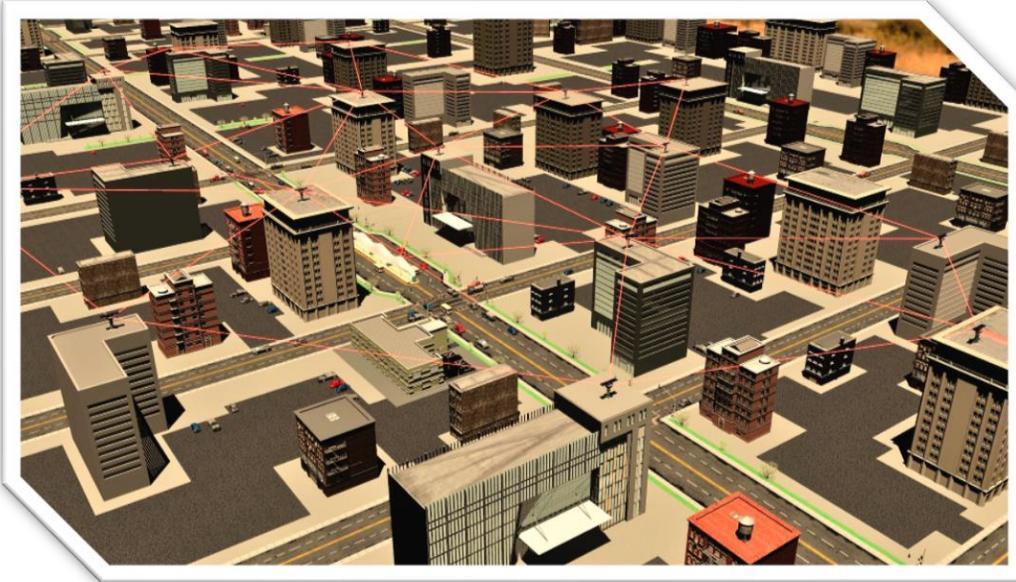
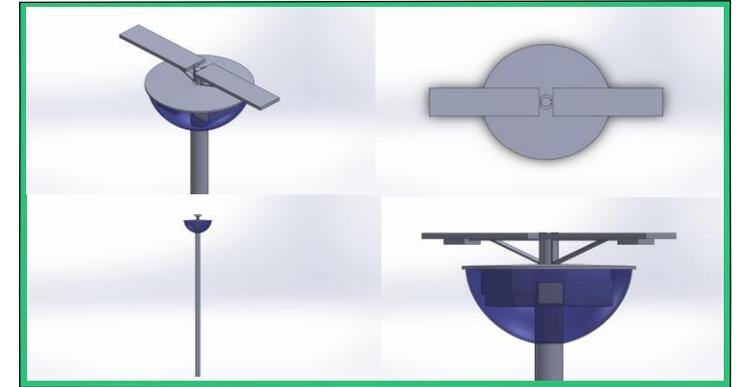
Prototype 2 – A 100m 10Gbps Single Channel Optical Wireless Duplex – Two Devices (Forms One Link) Built and Used as Demo in New Facility's Beam Line Feb 2018 ~\$3M Seed Round

Prototype 3 (initial outdoor test) – A 200m 10Gbps Optical Wireless Backhaul Combined with 1Gbps Wireless Network within 1,000ft Radial Distance





Prototype 4 - 200 meter 10Gbps Optical Wireless Backhaul integrated for pilot test with a OTS Wireless Radio Transmitter to provide up to 1Gbps Wireless Network connections within 1000ft radial distance



We are introducing an initial 10Gbps Backhaul Link at $\sim 1\mu\text{m}$ wavelength which can easily be multiplexed much higher

The “OptiNode” design will provide mesh network 1Gbps wireless bandwidth to the public... demo in OptiPulse parking lot Sept 2018



The Add-on Benefits from \$23 million Funding

Accelerating the Availability of Affordable High-Speed Wireless Broadband

Increases Employment & Earnings

Multiplier:
 Sales - 1.5 to 3.0x
 Skilled Jobs - 2.5 to 4.3x
 Earnings - 2.0 to 3.0x

Jobs: High Tech Positions
 But, More Skilled Workers
 High Value Benefits

CNM: Internships
 On the Job Training
 Workforce Development

Brings Facilities & Logistics Local

Local Suppliers: PCB
 Plating
 Logistics

Equipment: 3D Printers
 Chip Bonders
 Clean Rooms

Facilities: Photonics R&D Center
 Optics & Electronics Assembly
 Warehousing/Shipping

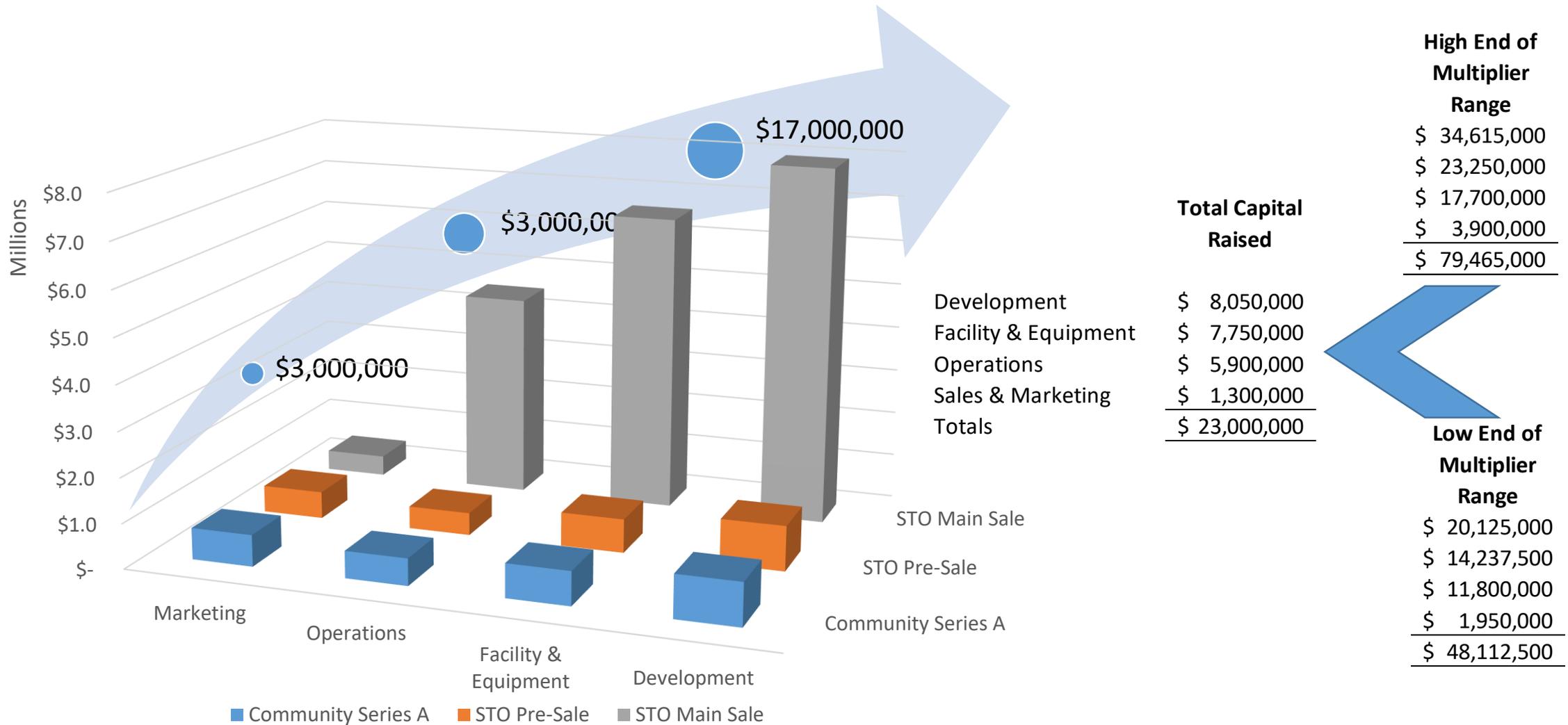
Community Enrichment

Job Market: Training
 Work from Home
 Smart City

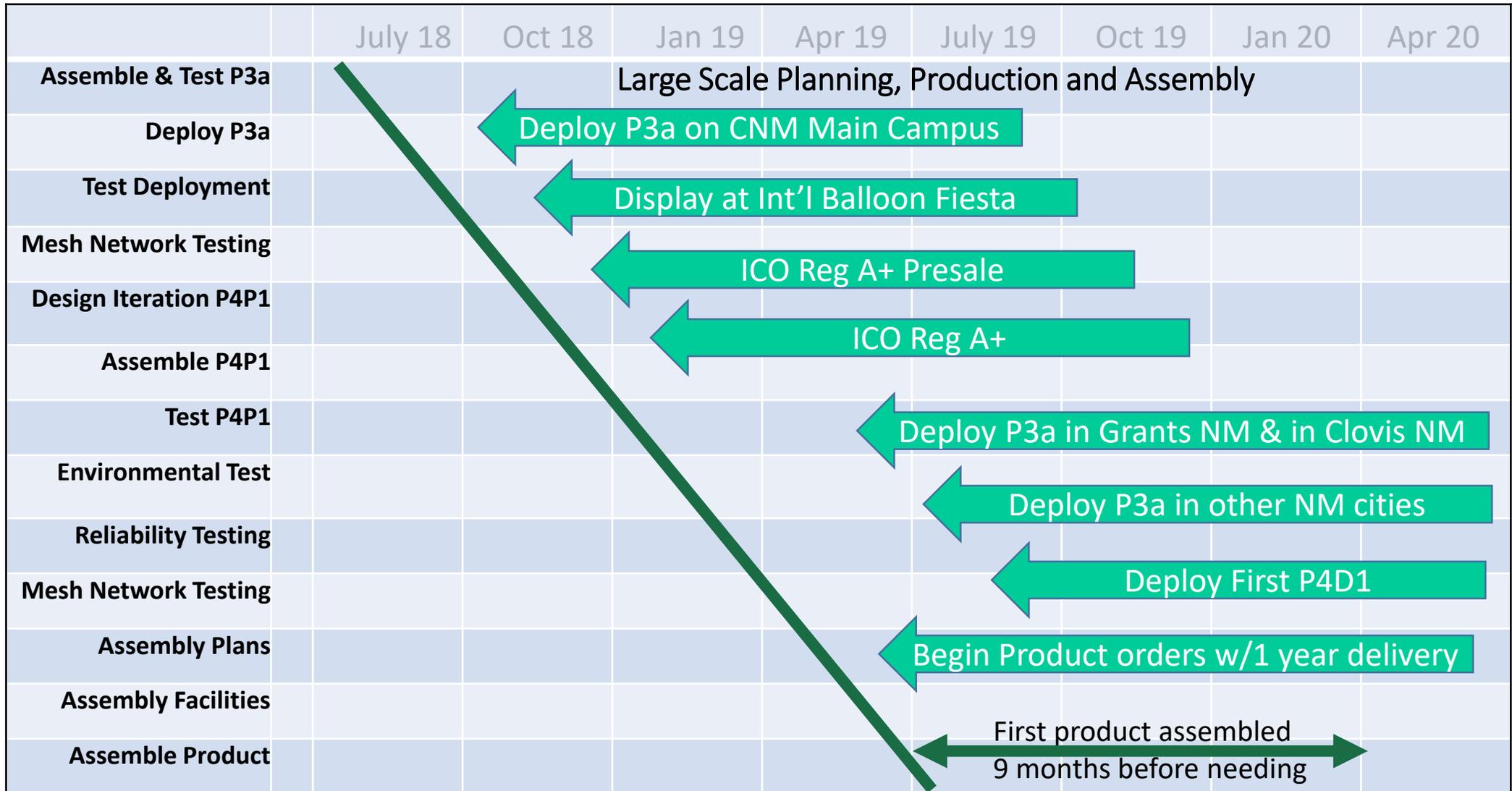
Education: On-Line Courses
 On-Line research
 Homework on Tablet

Health: In-Home Monitoring
 Telemedicine – Project ECHO
 Health Education Direct to Home

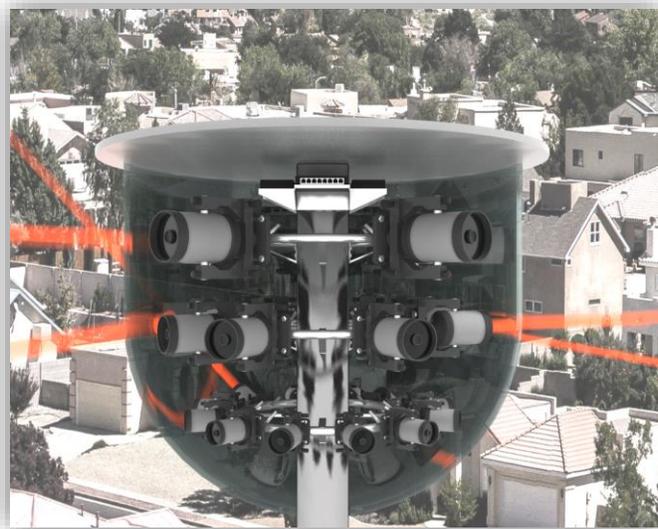
Spending Allocation, Total Raised & Multipliers



Development: Prototype 3a and 4



Development of Public Access Mesh Networks

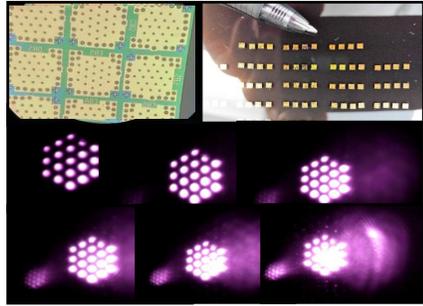


Future models of a Node will have multiple connections in the mesh network including direct last miles links

Backhaul will be developed at 25 Gbps per channel with multiplexing up to 100 Gbps

Wireless Networks within 1,000 ft. of Node can access 1Gbps within homes and offices by logging into OptiPulse enabled wireless network on their devices

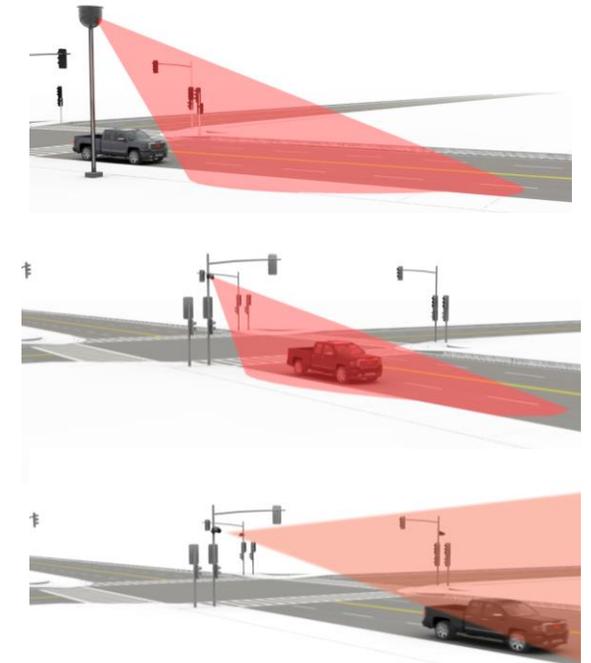
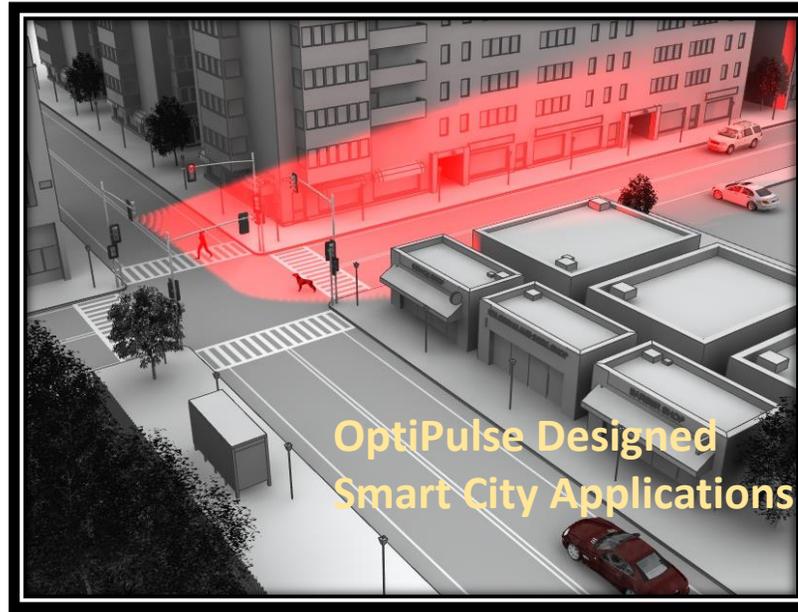
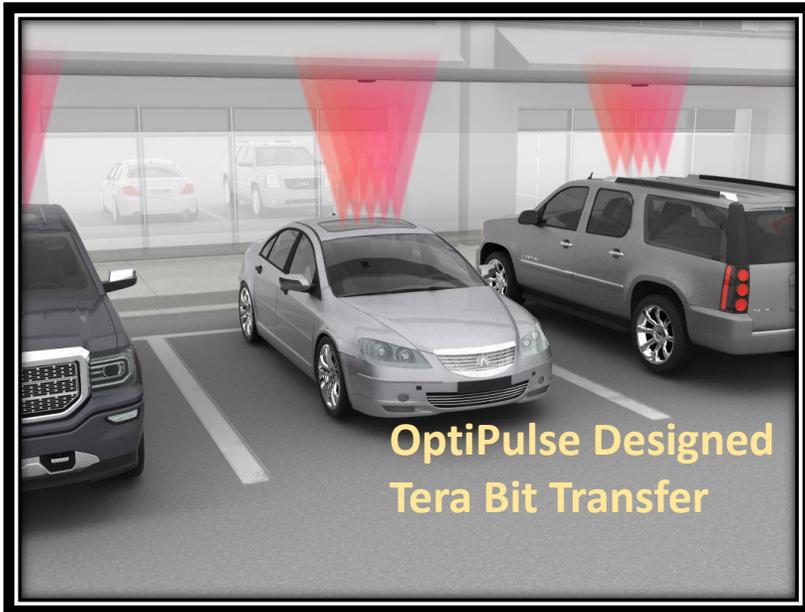
Light Grid chips will Enable “Deformable Fields of Light” Connecting and Scanning the Environment



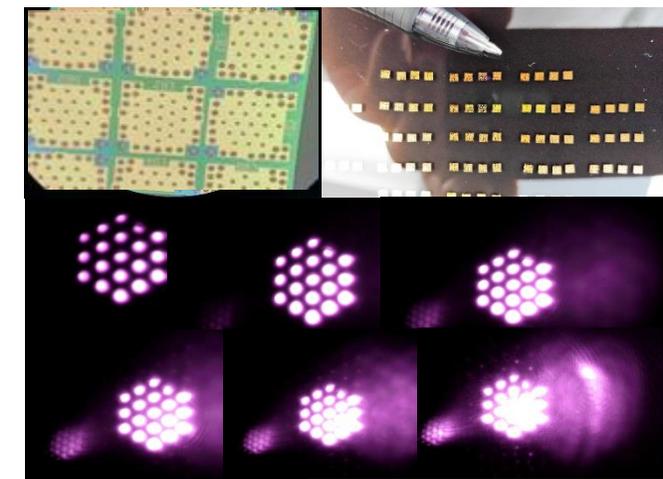
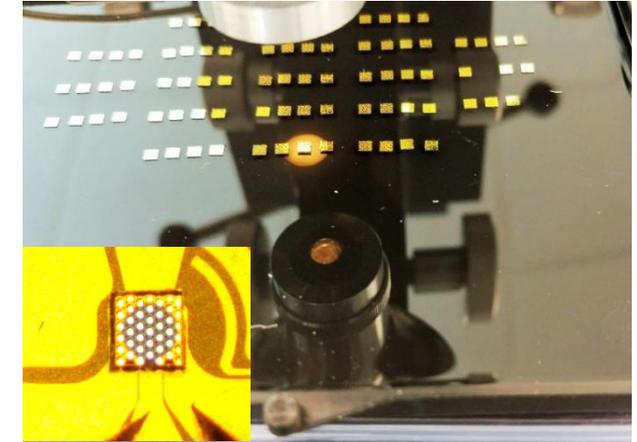
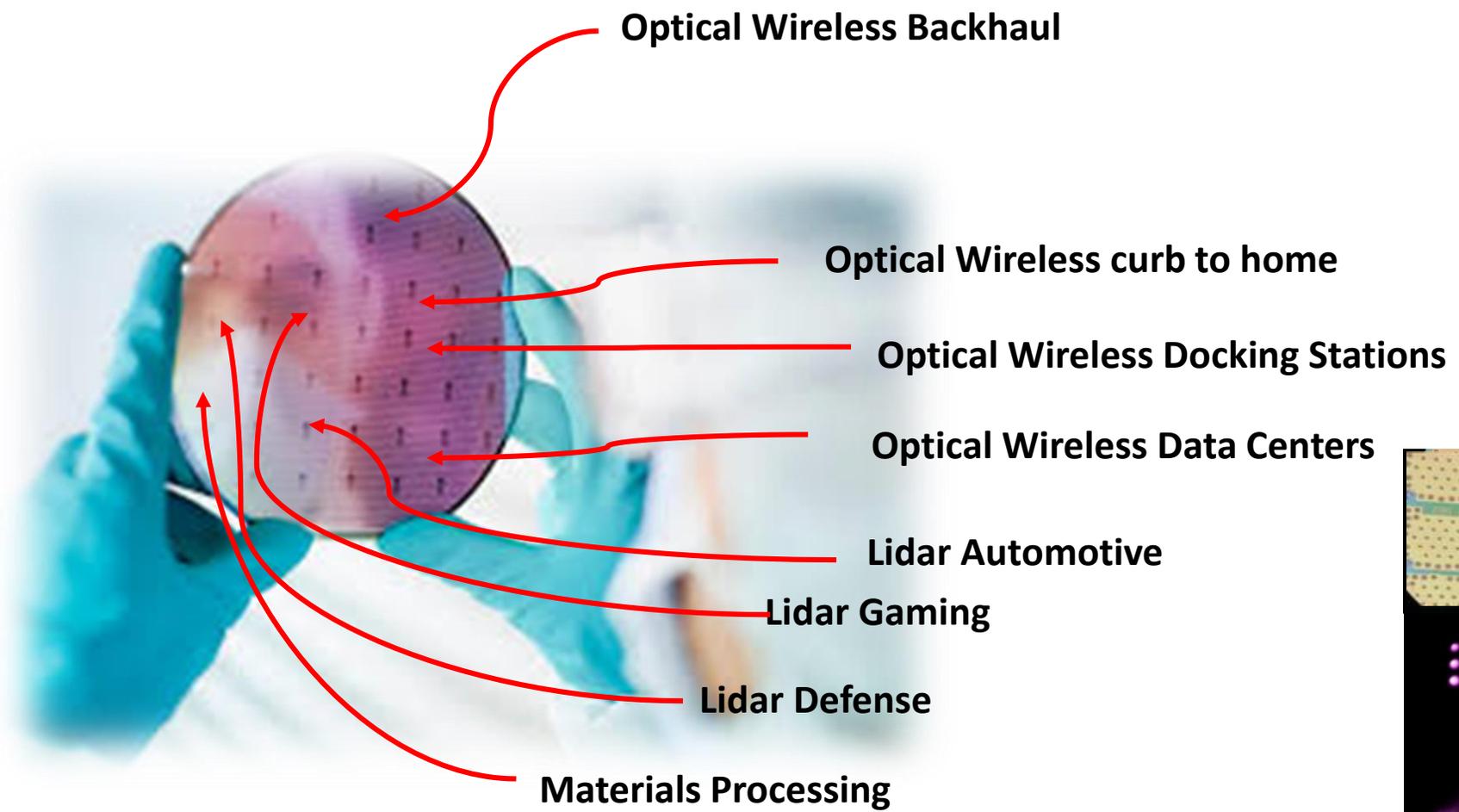
OptiPulse Designed Laser Chips Provide Incredible Wireless Speed for Inexpensive Bandwidth



High Power, High Speed Incoherent Light Enables Entire “Field of Light” to be Modulated or Pulsed, Providing Scanning or Transmit Capability

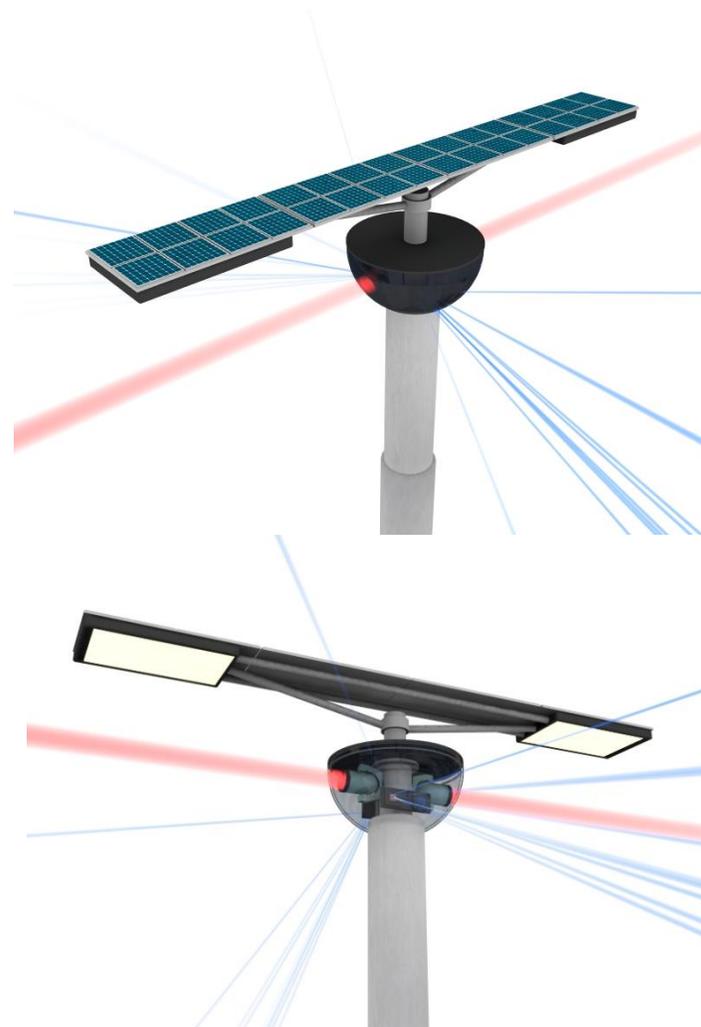


Multiple Applications on a Single Wafer



Smart Pole





Contacts

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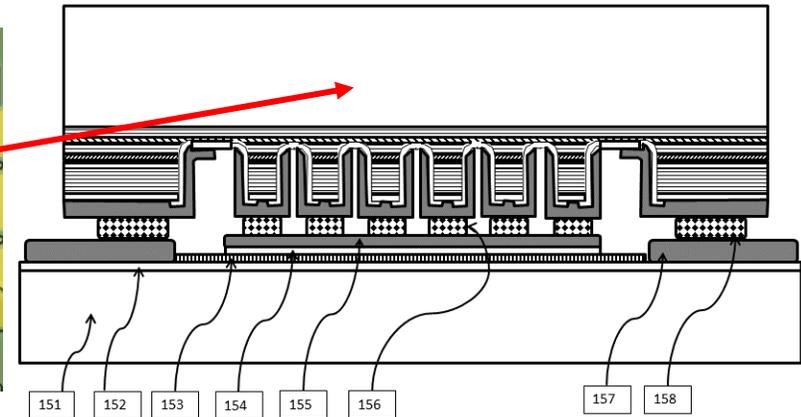
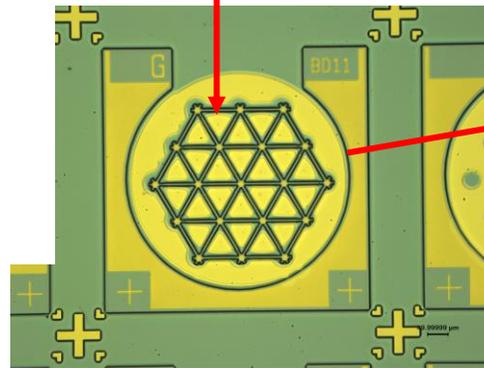
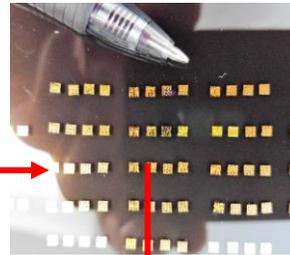
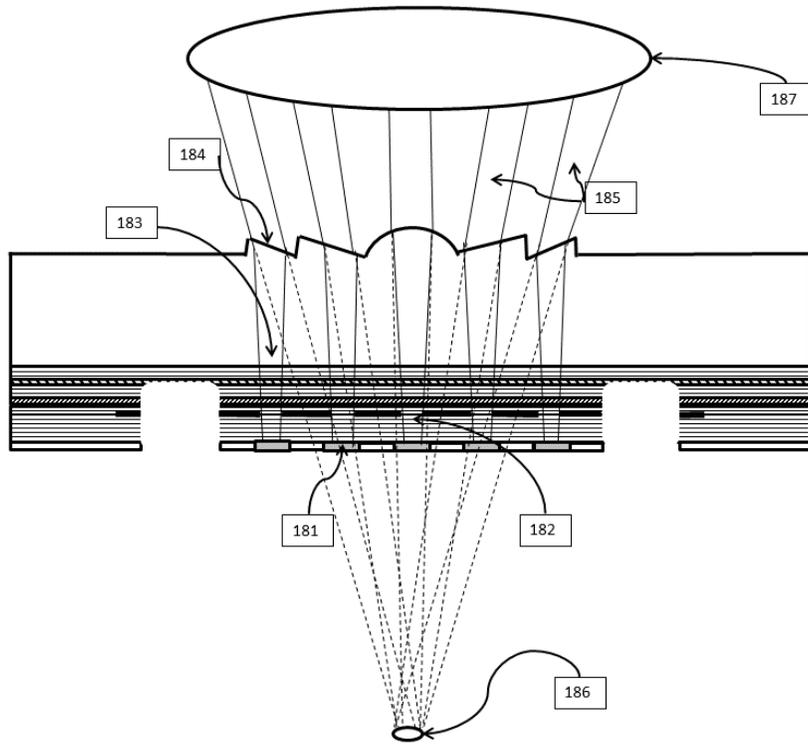
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Design Advantage 1

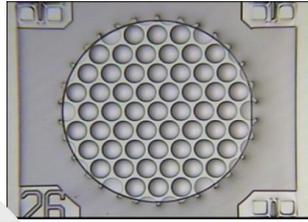
OptiPulse Patent Pending – describes device as “single mesa with multiple lasers using shorting mesa for waveguide integration while using wafer scale integrated optical elements to sum and shape beams”



Design Advantages: Offset Micro-Optics

Design Advantage 2

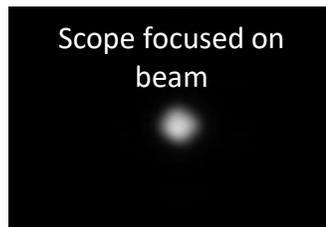
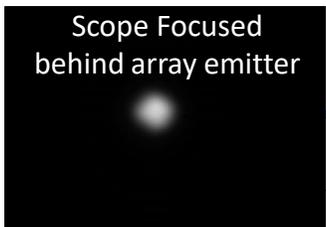
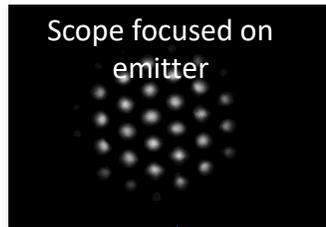
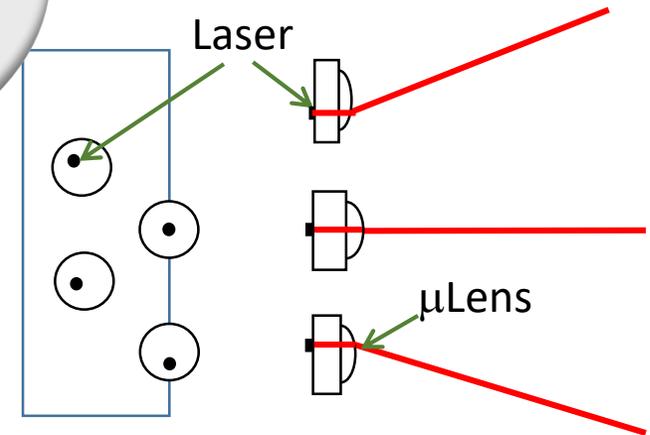
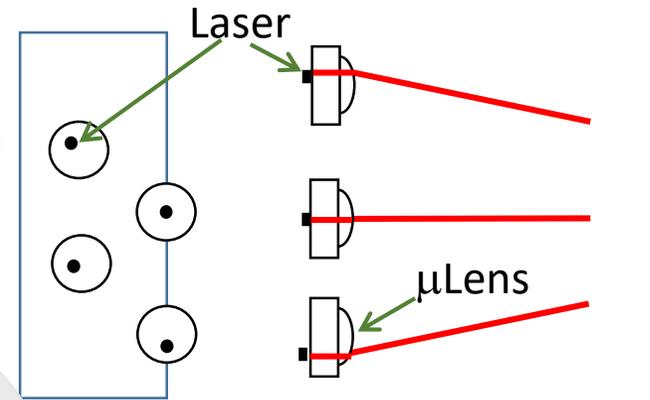
Simple lens array offsets from laser positions create a virtual point source
Which is also extra-fast



Wafer scale micro-lens etched into back of chips
Lens are ~60um diameters

Design Advantage 3

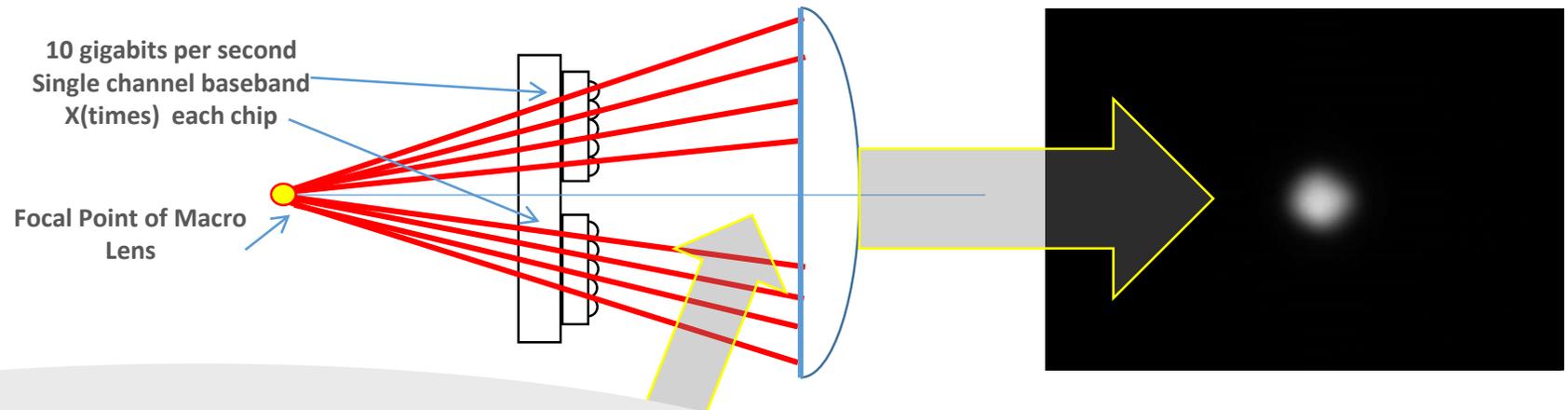
MicroLens wafer scale fabrication- Super cheap micro-optical definition enabling a single point source



Virtual Point Source

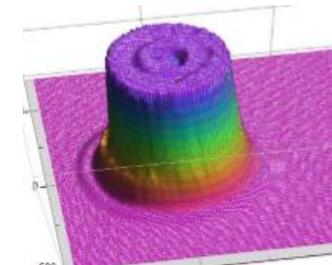
Array Emitter

A Large Lens Focuses Only on a Single Bright Light



Design Advantage 4

A Macro-Lens with its Focal Point on the divergence point images a single uniform Bright Spot that is large in the far field

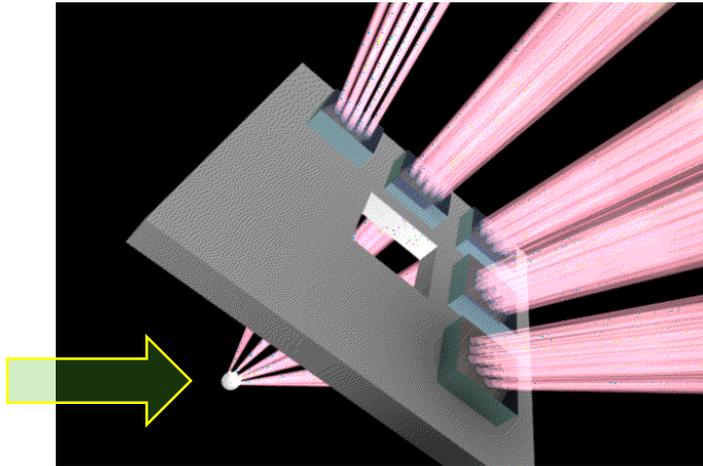


Top Hat Profile is ideal for Signal reception

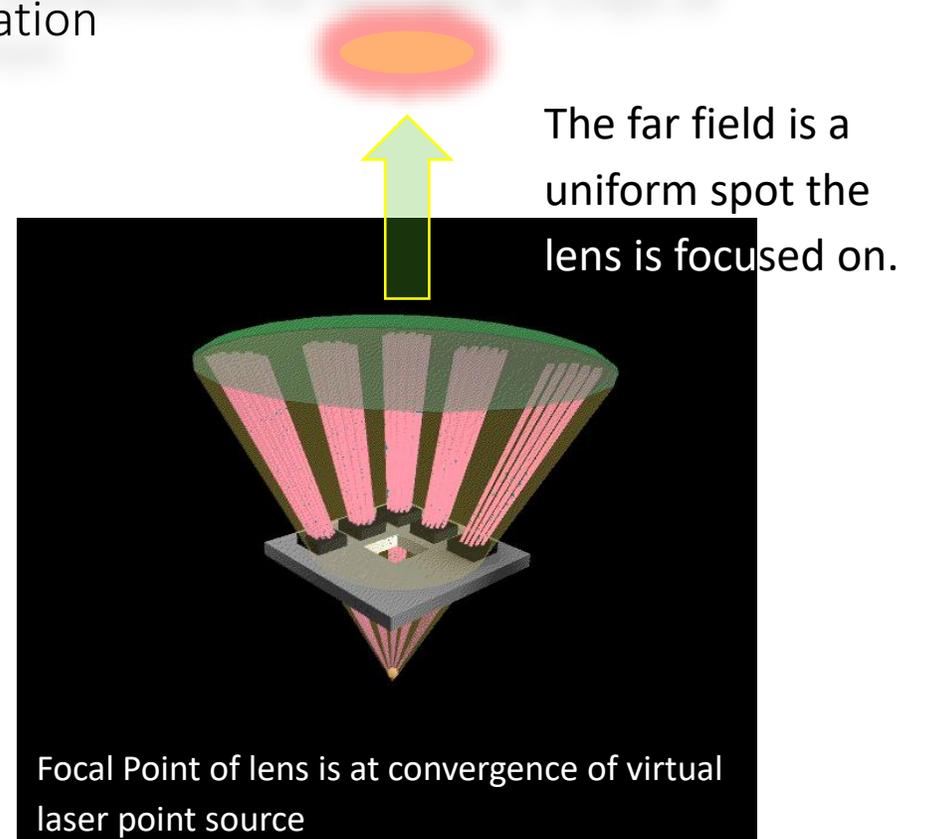
Single Optical Axis TxRx (Send and Receive)

A Substrate can have Multiple Electrical Waveguide Connections for Groups or Chips of Lasers with areas left open for 3D photonics integration

Lasers rendered behind chip are only illustrating where the lens sees the lasers coming from – a virtual point source



Lasers are emitted outward from sources



Advantages of TxRx configuration

- Scalable power – to ~5Ws per channel with >Easily Multiplexed
 - Single Lens for Emitter and Detector
 - Detector is positioned behind emitters for 3D integration (pic only shows emitters).
 - Divergence of combined beam is close to an individual lasers beam quality
 - Lasers can be external cavity single mode- high quality beams