Precision Agriculture: Innovation Explosion Keeps Food on Our Tables
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COO
Trilogy Networks
Solving World Hunger
Precision Agriculture Priority – Why?

Growing world population
- Demand for more and better food

Turn towards technology
- Accelerated deployments
- Increased technology sophistication

Drive more profit from constrained assets
- Land and water
- Increase yield per acre / $ per acre

Decisions with hard data – less intuition
- Vast array of information: sensors, drones, robotics
- Massive data handling requirements

Results
- Aggressively expanding market
- Immediate requirement for success

Laying Fiber – Deploying Edge Compute & Connectivity – Applications To Solver World Hunger

Meeting the evolving needs of a growing population by 2050 *

2M U.S. Farms – Across 1.5 Million Square Miles

* Bayer report
# Rural America Specialty Crops

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<th>Business Function</th>
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- Machine Learning and Visioning  
- Pest Prevention and Monitoring  
- Smart Irrigation  
- Robotic Harvesting  
Ground:  
- Input Use and Management  
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- Frost Detection  
- Robotic Harvesting | $2.0B  
$1.5B |
Rural America Specialty Crops

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**PRECISION AGRICULTURE – TYPOLOGY**

Observe – Orient – Decide – Act

**ON BOARD**

- Robot in corn field monitoring moister – logging data
  - Compute capability on device
  - Low latency
  - Real-time decision making
  - See, analyze, redirect
  - Economically feasibility for **low data** intensity only

- Example: logging data and object avoidance
  - Do not run over the dog

**OFF BOARDING AT THE EDGE**

- Drone and or robotic preforming mission with real time direction
  - **Local** compute capability
  - Low latency application
  - Real time **mission planning**
  - Data intelligence algorithm
  - Requires analysis – direction
  - **Local** data storage; data **privacy**

- Example: Pest identification, EPA mapping, eradication – precision spraying;
  - Don’t kill neighbors crops

**OFF BOARDING AT THE CLOUD**

- UAV today - preprogramed high data computation mission
  - Very high data computation – **1 terabyte** per hour drone
  - Programmed in advance
  - Download data later
  - Real time direction not required
  - Potential to **pair** with other solutions

- Example: Livestock migration, vector movement, environmental threats, information – **pair edge solution**
  - Do kill coyote

**Complexity and Cost Efficiencies will Drive Network Typology**
THE 4TH INDUSTRIAL REVOLUTION – TSUNAMI

Automation – Cost Reduction – Competitive Agility

DIGITAL TRANSFORMATION
- Embrace – Smart Technology
- Connected to Everything
- Revolutionize Work, Live & Play

DYNAMIC ENVIRONMENT
- Hybrid – Multi Cloud Edge
- Migration from Cloud to the Edge
- Technology Requires – Low Latency
- Drives IoT – AI – ML

DISRUPTIVE MARKET OPPORTUNITIES
- Emerging Business Models – Billions of Dollar Investments
- Rural Market Available Now
- Government & Social Mandates

RURAL – THE LAND OF OPPORTUNITY – REAL AND HAPPENING IN REAL TIME
**RURAL INDUSTRIAL DILEMMA**

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<th>SOLUTION</th>
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<td>Inadequate Physical Infrastructure</td>
<td>Integrated Gateway to Rural</td>
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**Enterprise Require:**
- Cloud Native Solutions
- Ubiquitous Reach

**Hyper-scalers Require:**
- Nationwide Connectivity
- Edge Compute & Storage

**Applications Providers Require:**
- Scalable Access to Market

**Connectivity**
- At and to the farm
- Host of technologies
  - Fiber
  - Wireless
- Public and private

**Cloud Computing**
- Edge Delivery Platform
- Multi-Cloud, Multi-Tenant

**Applications Enablement**
- Marketplace - 5G and edge solutions

**AGRICULTURE CONNECTIVITY COULD UNLOCK**
**+$500B IN GDP BY 2030**

*Bayer, Exploring the future of agriculture*
Rural America

USDA **Rural** Definition:
Cities and towns with population of **less than 5,000** built around the support of **agriculture, ranching and energy production** and supporting community infrastructure.

**Value Proposition:**
Rural enterprises and industries are unable to capitalize on advanced technologies to embrace Industry 4.0. **Advanced applications require connectivity, compute and storage near the point of usage – the edge.** To fully embrace these monumental leaps in technology **seamless, nationwide, consistent, secure, connectivity** is imperative.

Trilogy is building a **distributed cloud network** to enable those solutions where needed across **1.5M square miles** of rural America.
Rural – Broadband ABC’s

Diverse and massive number of service providers across geography
- 850 community based telco providers*
- 280 local municipalities*
- 120 cellular providers
- 900 rural electric co-operatives
- Tribal lands

Broadband Coverage Highs and Lows:
NTIA member companies* - 1,000 telco/municipalities
- 70% member have fiber to home
- 68% access to 100MG
- Cover 37% U.S. land map
- Approximately 7% population

Large geographic areas within large carrier footprint left abandoned
Coverage gaps addressed by CLEC’s, Cellular, Satellite and other technologies

Significant Progress Made – Long Way to Close Digital Divide
**GOVERNMENT PRIORITY – WHY?**

Reconnect:
- $1.6B Rounds 1 and 2
- 163 projects / 35 states
- Round 3 pre-release review – $600M

Rural Electric Infrastructure Loan Program
- $5.5B annual loans
- Support and deploy Rural Co-op broadband

Rural Digital Opportunity Fund (RDOF)
- $20.4B over
- $9.23B awarded to 180 operators
- Serve 5.2M locations – 49 states; 1 territory
- 85% winners provide 1G

American Broadband Act
- $23B over 5 years – introduced/not passed

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Economic development  Job Creation  Secure Food Supply Chain  National Security  Sustainability
**Unique Model for Adoption and Revenue Acceleration**

**ACRES: Assembled Industry Power Brokers**

*Built 65 Member Coalition of Operators, Edge Innovators and Application Developers*

*Created Dynamic and Complete Ecosystem*

*Network Effect to Grow Exponentially*
  - Carriers
  - Technology Suppliers
  - SaaS Applications Providers

*June 30, 2020 - Trilogy Launched the RCI*

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**Telco & Cellular Service Provider**

<table>
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<tr>
<th>Chat Mobility</th>
<th>Nemont</th>
<th>Pine Belt</th>
<th>UNITED Wireless</th>
<th>RNA</th>
<th>FARMERS</th>
<th>DCN</th>
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<td>BROADBANDNOW</td>
<td>ASTAC</td>
<td>SILVER STAR</td>
<td>NMT Wireless</td>
<td>metaLINK</td>
<td>SBA</td>
<td>STRATA</td>
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<tr>
<td>South Central Communications</td>
<td>FMTC</td>
<td>Tangle</td>
<td>CCC</td>
<td>rainbow</td>
<td>Edge Presence</td>
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**Edge Technology Suppliers**

<table>
<thead>
<tr>
<th>Intel</th>
<th>Seagate</th>
<th>ROBIN</th>
<th>Pluribus Networks</th>
<th>Lanner</th>
<th>ALTIOSTAR</th>
<th>INTELSAT</th>
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<td>celona</td>
<td>GenXcomm</td>
<td>Vapoi</td>
<td>amsoc</td>
<td>Druid</td>
<td>MATRIXX Software</td>
<td>ATHONET</td>
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**Application & Solution Providers**

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<th>SkyPeak</th>
<th>Sentry</th>
<th>microclimates</th>
<th>GrowFlux</th>
<th>agtools</th>
<th>GRANDFARM</th>
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FINANCIAL CASE FOR RURAL BROADBAND

Evolving to a world with insatiable need for broadband – projected requirements of **1.5G/2G symmetric** within the next decade:

- Require download and **upload speeds** to unlock technology potential
- **88%** of all U.S. Capex from rural or small service providers
- Costs models based on **linear density** – cost per home

2020 FCC Statistics

| 65M homes/business passed w fiber | Those cable access 74M locations 30K per pass Cost $1,200 - $1,300 per location – still viable | Last 2% copper or fixed 14M locations 60K per pass 30 year -$100B business case no longer viable |

Can We Afford It – Can We Not Afford It – Or Alternate Technologies