AUG 2019
ALERT2 RF vs other media

Joint HSE and OneRain

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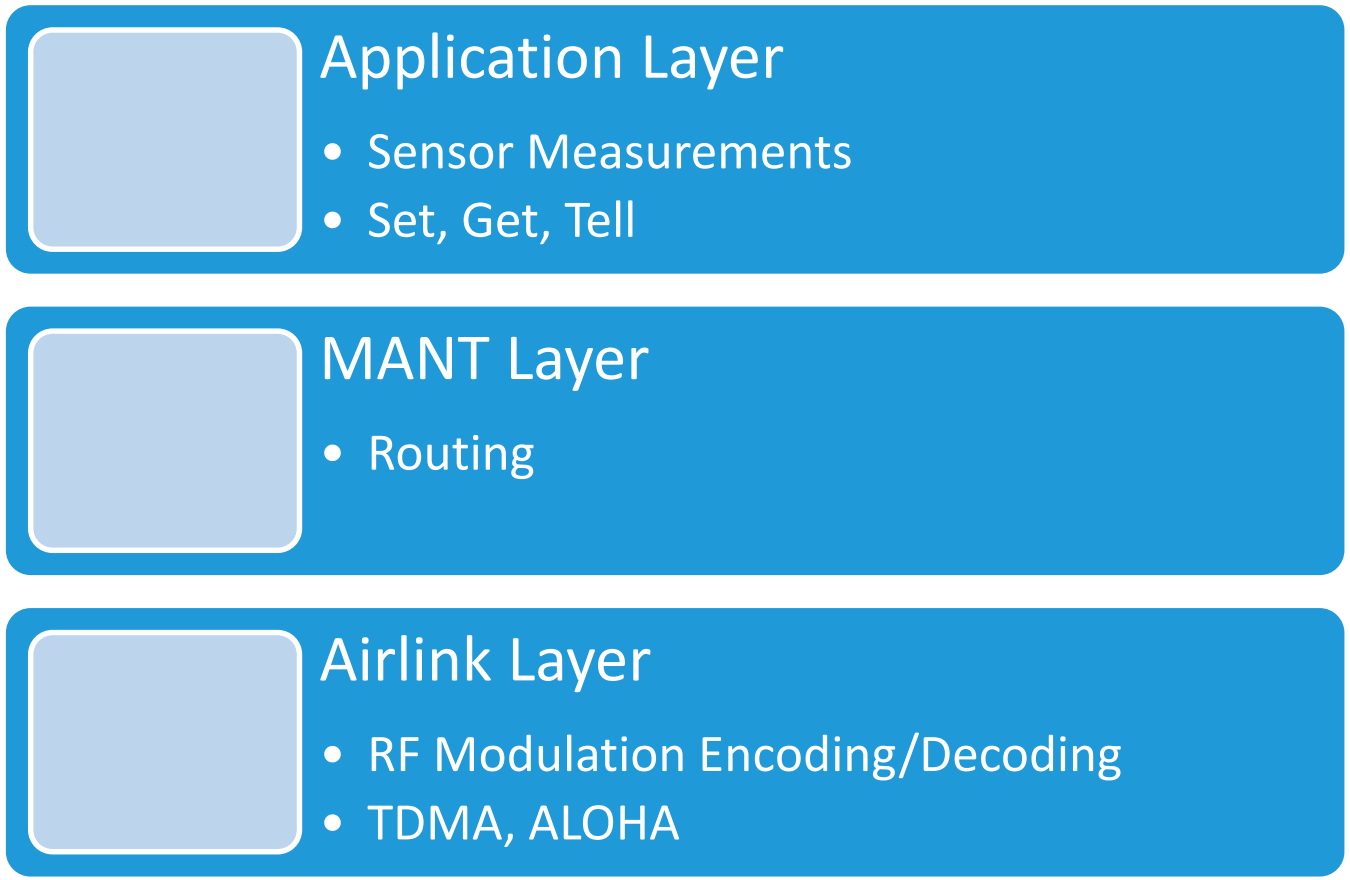
Summary

- ALERT2 – Built on layers
- ALERT2 over RF
  - Typical implementations
  - Limitations
- What about other media
- Typical approaches by different vendors
  - Decoders/Repeaters
  - Cellular (HSE and other vendors)
- How can you benefit from ALERT2 over other media

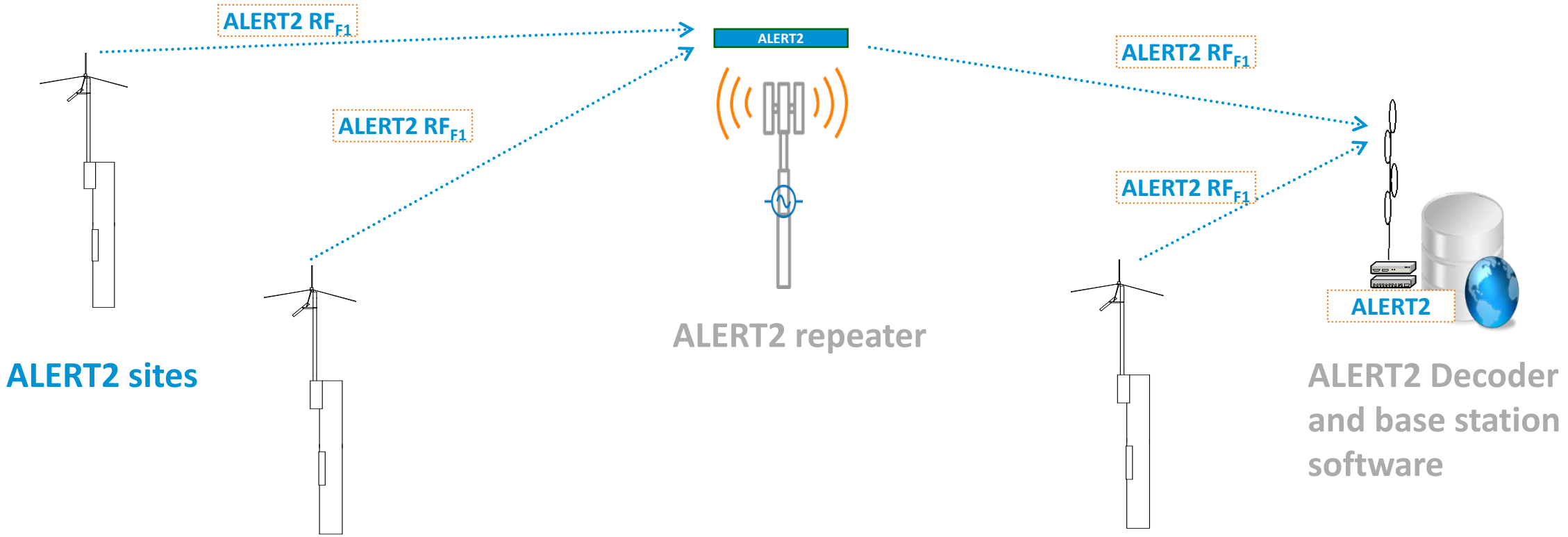
ALERT2 – Built on Layers



- Application layer not specific to transport
- MANT Layer needed for identifying sites
- Airlink Layer is specific to RF
- Originally Designed for RF
  - What about other media?
  - IP, Cellular Data, LoRaWan, Satellite

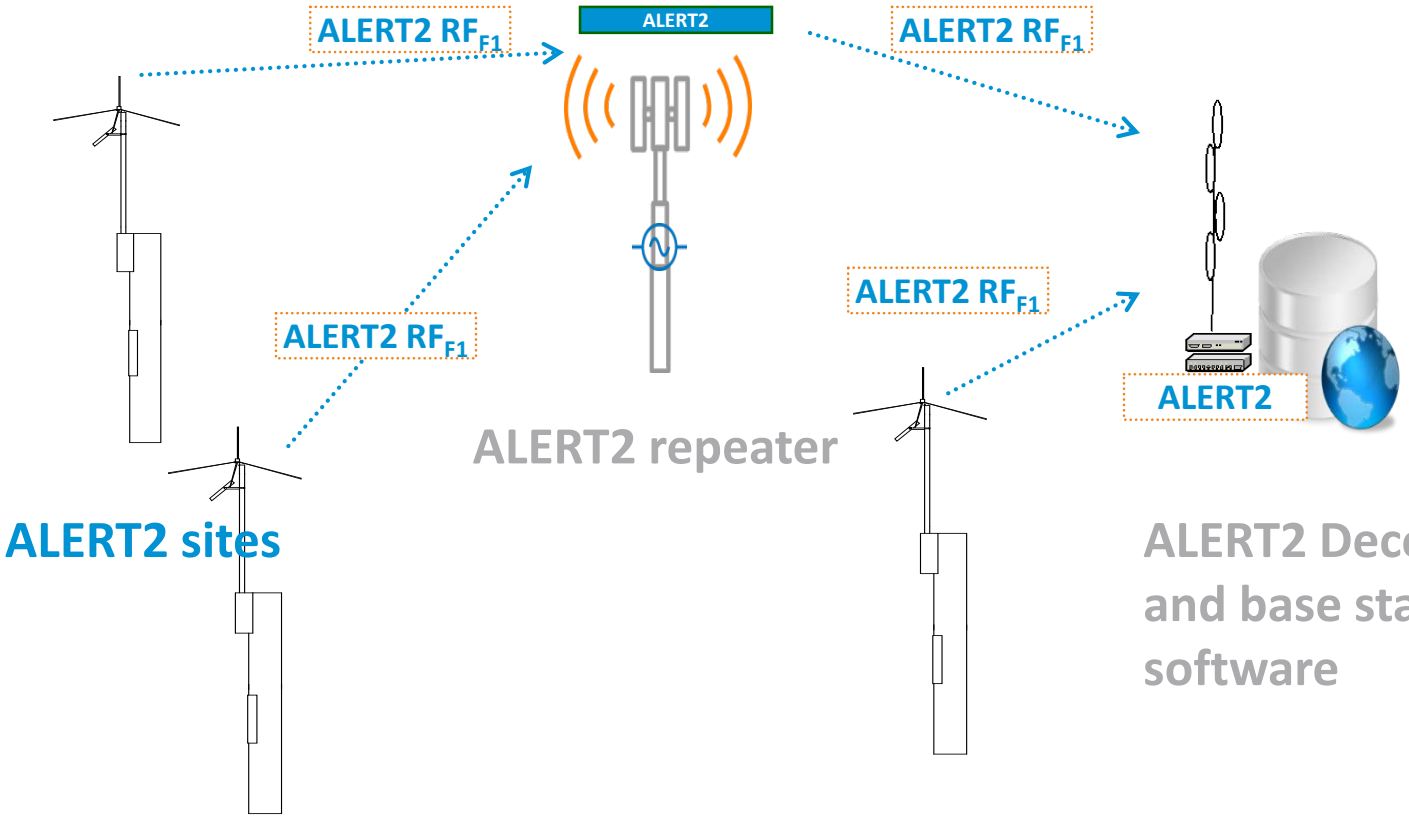
ALERT2 over RF – Typical Implementations

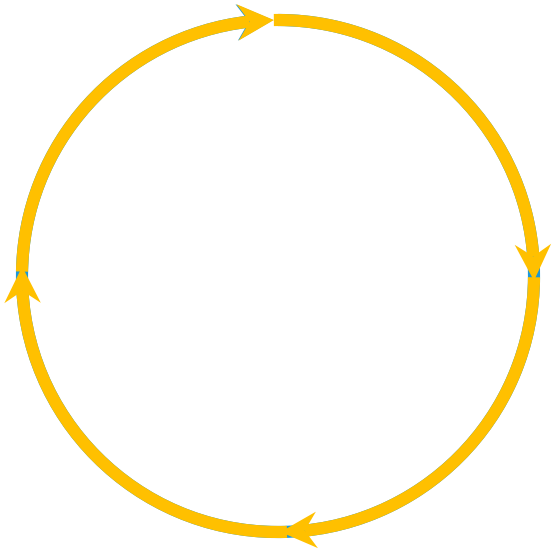
- Diagram showing RF Network with Site(s), Repeater, Base Station Decoder



ALERT2 over RF – Requires TDMA

- TDMA – Time Division Multiple Access (Everyone gets a turn to transmit)
- ALERT2 Transmitters use GPS – Accurate Clock for TDMA





ALERT2 over RF – Limitations

- Radio network with line of site (LOS) route from all sites to Base Station
  - Sometimes LOS routes are impossible
  - Require adding repeaters, could be expensive if only a few or one site can't get in
  - Infrastructure cost of maintaining repeater networks
- Why would you build an ALERT2 RF network?
  - If you are building a network, then costs are justified
  - If you are installing single or few remote sites, then costs of building a working LOS network can make it impractical

What about other Media?

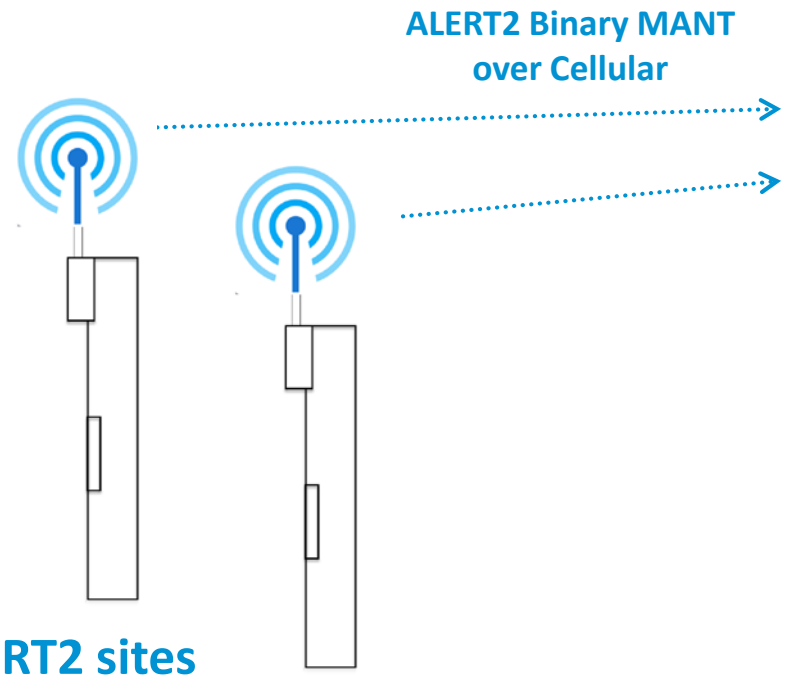
- IP Networks
  - Wired
  - Wifi
- Cellular Data
  - Also IP locations
- Satellite
  - Irridium, Inmarsat, Hiber, others
- Other media
  - LoRaWan, Sigfox, …

Typical Approaches by other vendors

HSE and Other Vendors – ALERT2 over Cellular

Pros
- Good if no LOS path to Base Station
- TDMA not required, thus no GPS radio needed
- Cost
- Consistent data format across media

Cons
- Out of luck if tower goes down
- Cellular data fees
- Redundancy



ALERT2 sites

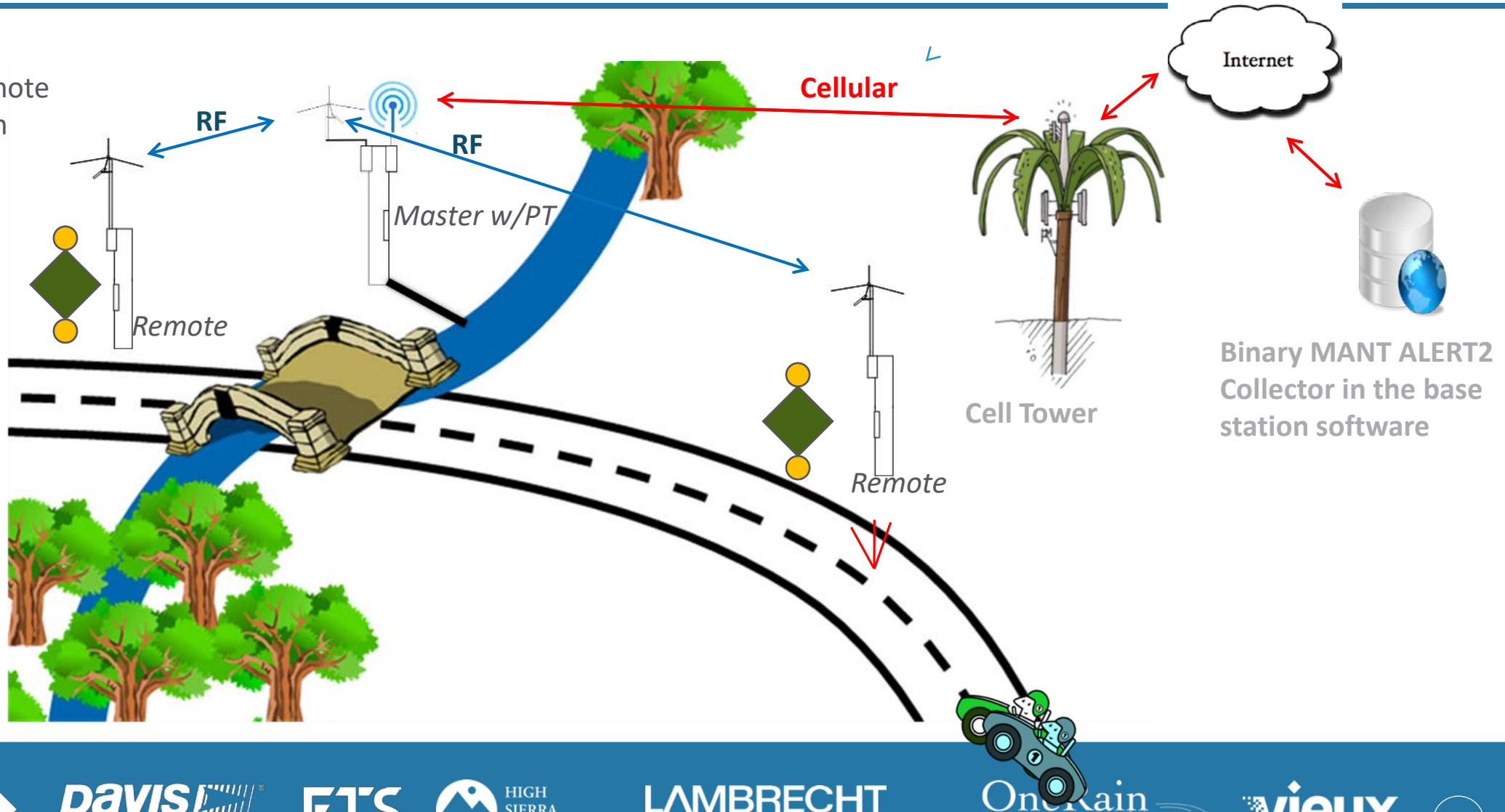
Cell Tower

IP/Port

Binary MANT ALERT2 Collector in the base station software

Hybrid System: ALERT2 over both RF and Cellular
*** HSE 2-Way High Water Detection System Example ***

- RF: Master to/from Remote
- Cellular: Master to/from Base station



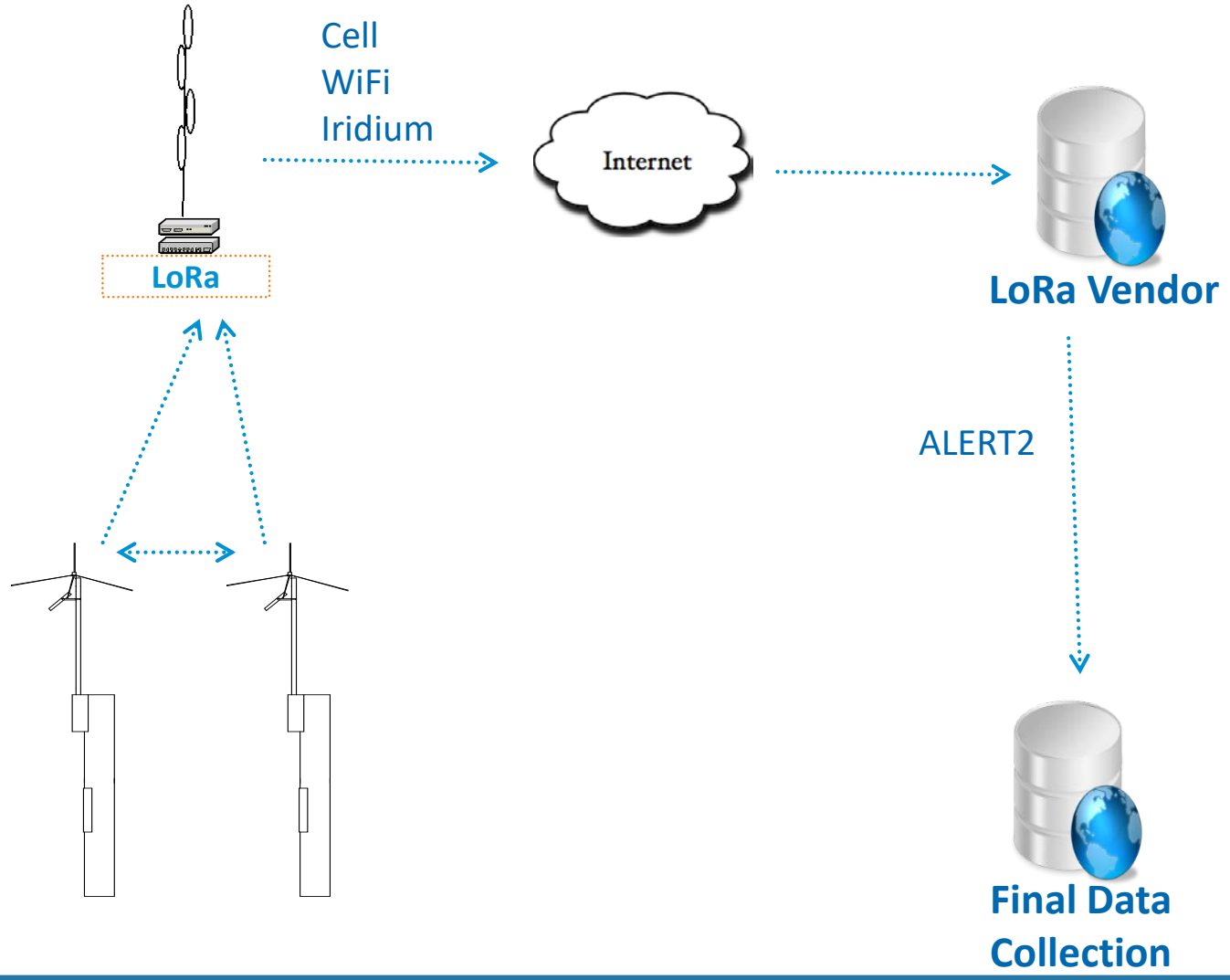
LoRa and LoRaWAN

- LoRa: physical layer mesh networking over RF
- LoRaWAN: networking protocol from RF endpoint to networking endpoint
- Low-Power, Wide Area (LPWA) networking protocol
- Bi-directional communication
- Baud rates: 0.3 kbps to 50 kbps
- Frequency: 900 Mhz
- LOS

Evigia and Progeny

- **Evigia**: Mesh LOS Radio Network (LoRa)
- **Progeny**: Cell Network

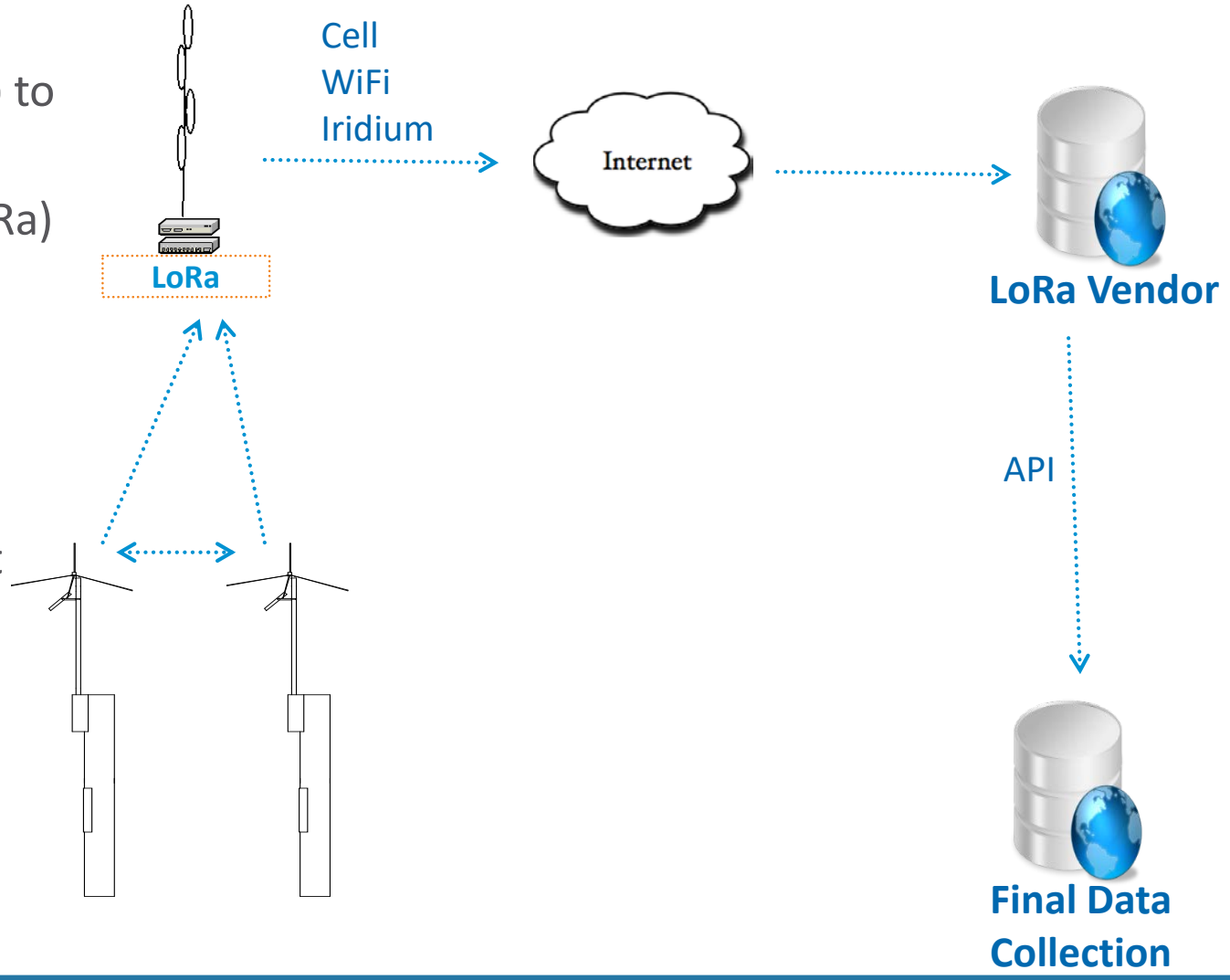
- Use LoRa/LoRaWAN format for data
- Data pushed to their cloud
- Stream ALERT2 from their cloud to Contrail



Intellisense and Green Stream

- **Intellisense**: Mesh LOS Radio Network (LoRa) to cell/WiFi/Iridium,
- **Green Stream**: Mesh LOS Radio Network (LoRa) to cell/WiFi

- Use LoRa/LoRaWAN format for data
- Data pushed to their cloud
- Data collected into Contrail via API and direct data decode



LoRa – Low Cost Sensor Pros/Cons

Pros

- Low Cost
- Quickly deployable
- Easy deployment

Cons

- Not ALERT2
- Not resilient and/or redundant
- Don’t have control over infrastructure
- Data feeds and formats to manage
- Not completely open-source

How can you benefit from ALERT2 over other media?

- Remote sites where LOS radio is impractical
- Leverage “Application Layer” with robust standardized sensor readings
- Some solutions may be a better fit based on requirements and cost
- Hybrid radio/cellular allow for remote small networks

Questions?

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