



# Campbell Scientific Canada

## Real-Time Workshop



# IoT and Smart “Cities”

How IoT might actually impact your network.

# What you should leave with...

- › More Questions Than Answers....
- › ...but the right questions...
- › ...an idea of how IoT might impact you
- › ...what value IoT efforts may have for your monitoring program



# The problems every network faces...

- › ...”do more with less”...
- › ...budgets...
- › ...program justification
- › ...staff training and retention...



# What is IoT

????

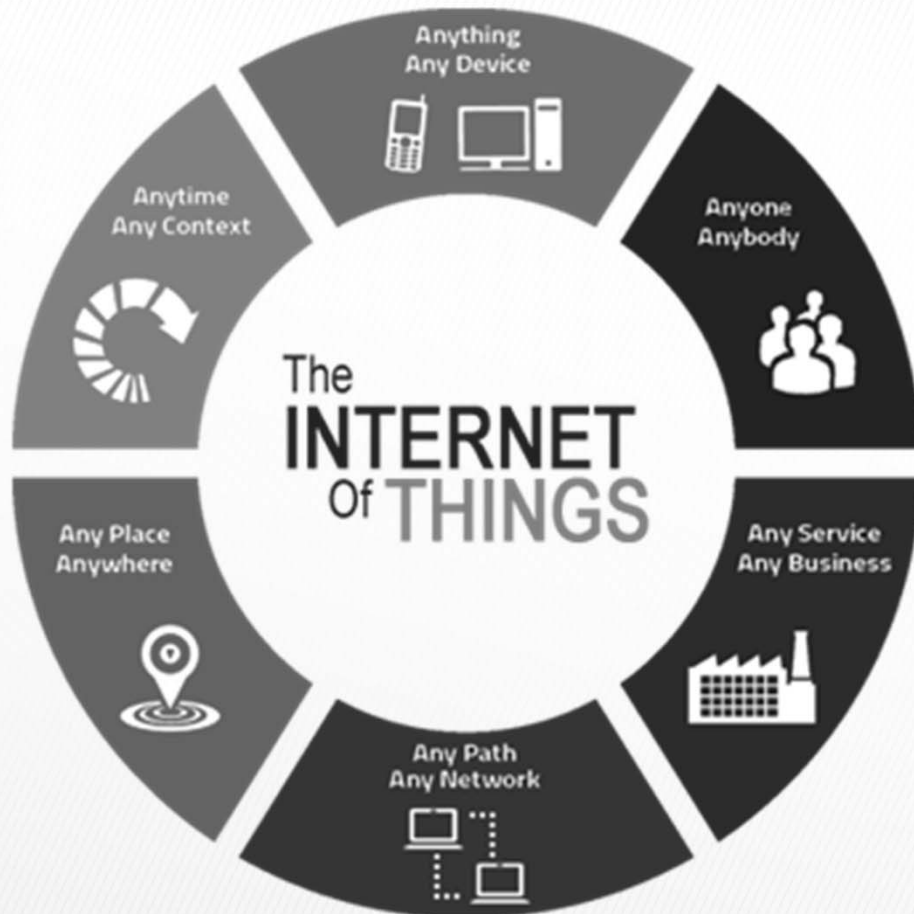




The Internet of Things is the interconnection of endpoints (devices and things) which can be uniquely addressed and identified with an IP (Internet Protocol) address. With the Internet of Things, devices can be connected to the Internet, sense, gather, receive and send data and communicate with each other and applications via IP technologies, platforms and connectivity solutions.

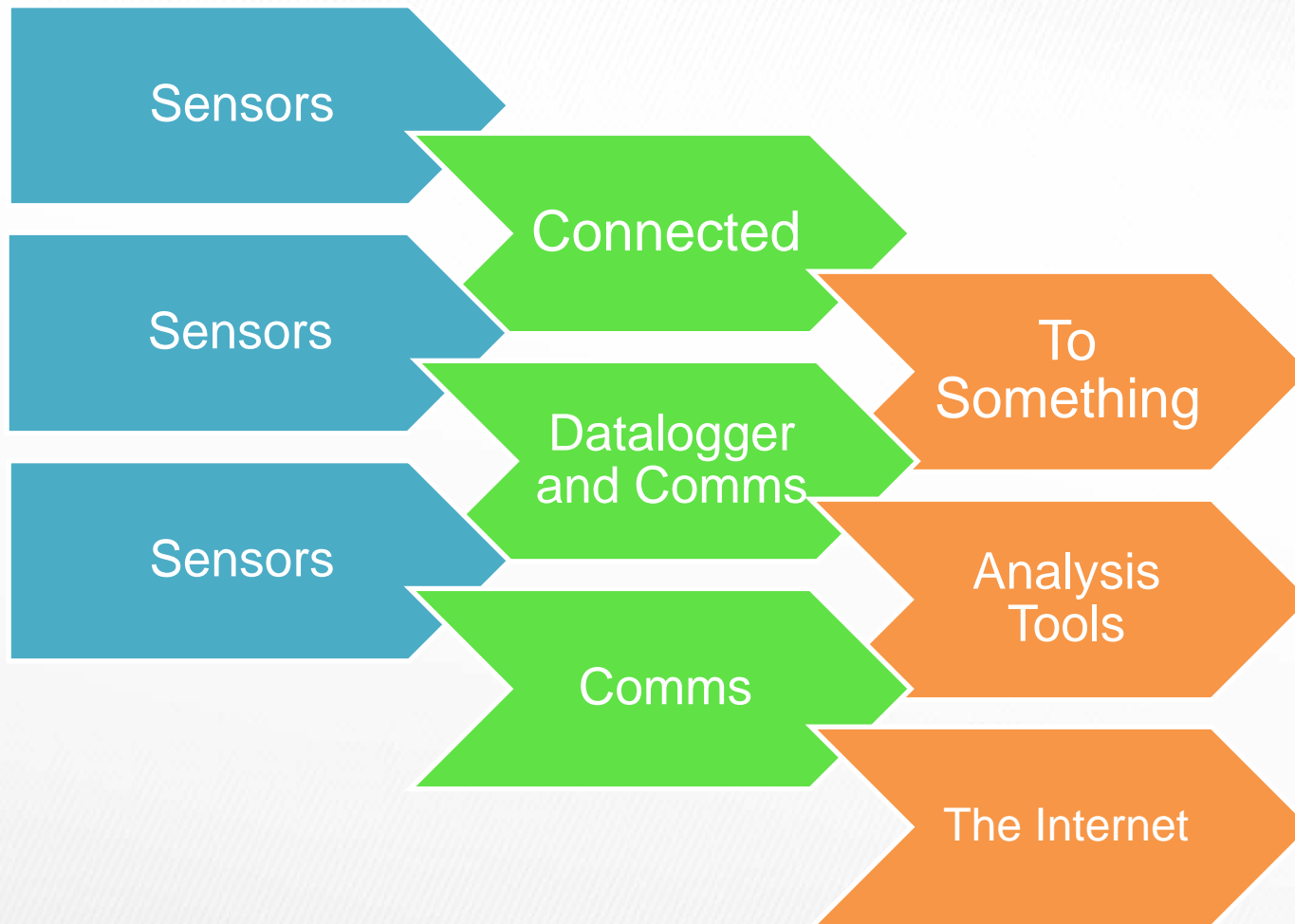








# The Simple Answer...



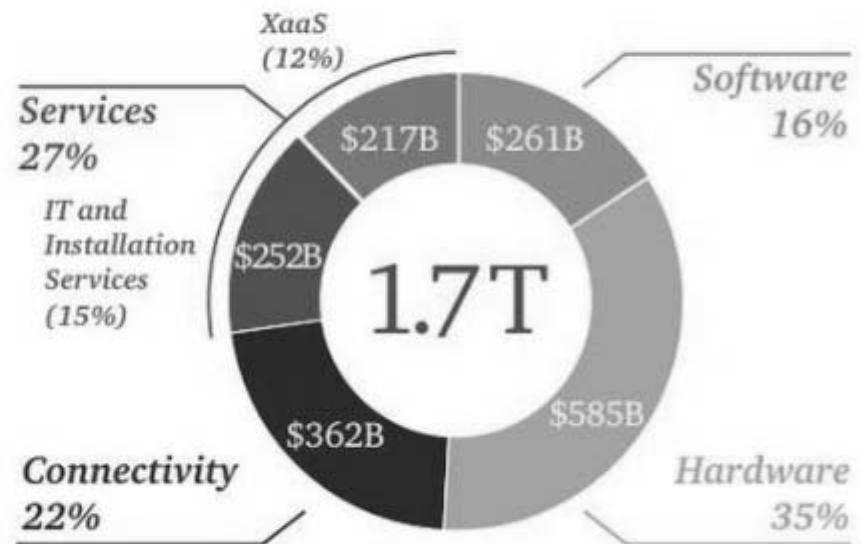
# IoT – How it Can Benefit You

Figure 1: Forecasted worldwide IoT revenue by technology element in 2020

## Investment in IoT solutions: An exponential growth path

According to current projections:

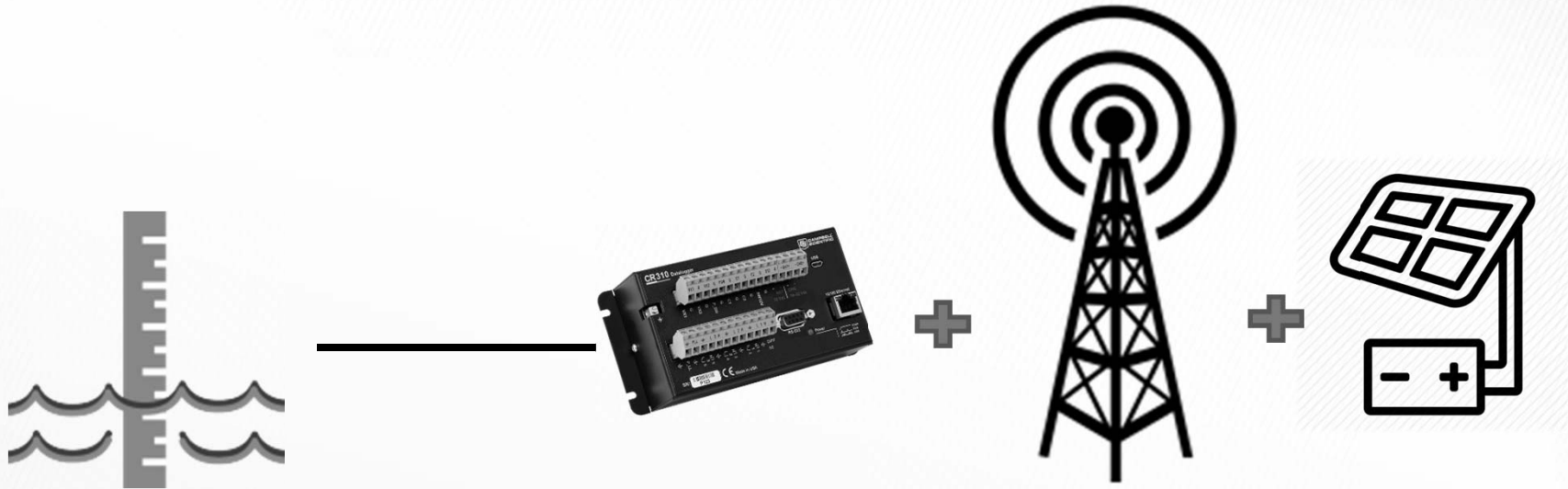
- A cumulative total of US\$6 trillion will be spent on IoT solutions between 2015 and 2020.
- IoT investments by businesses will grow from US\$215 billion in 2015 to US\$832 billion in 2020, while consumer spending on IoT solutions will rise from US\$72 billion to US\$236 billion.
- According to IDC, the IoT marketplace will be worth US\$1.7 trillion in 2020, with the biggest portion being hardware, followed by services, connectivity and software.



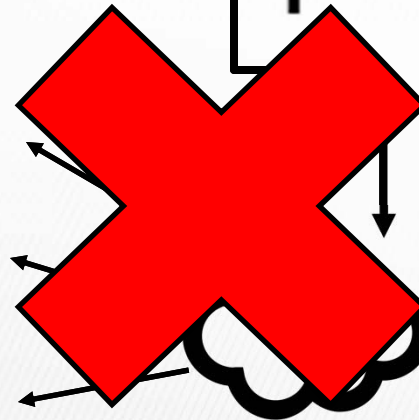
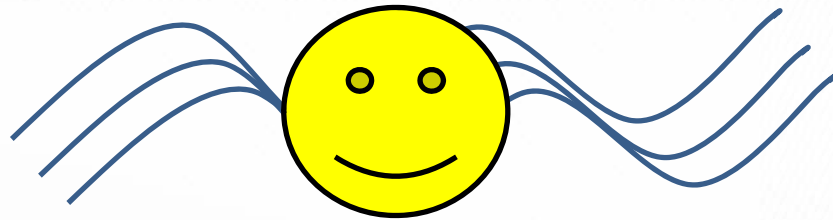
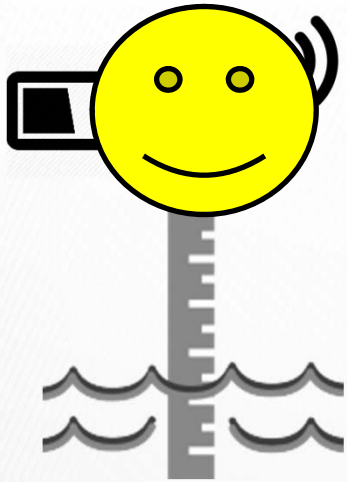
Sources: "IDC's Worldwide Internet of Things Taxonomy, 2015," IDC, May 2015;  
"Worldwide Internet of Things Forecast, 2015 – 2020," IDC, May 2015.



# Our Current Paradigm



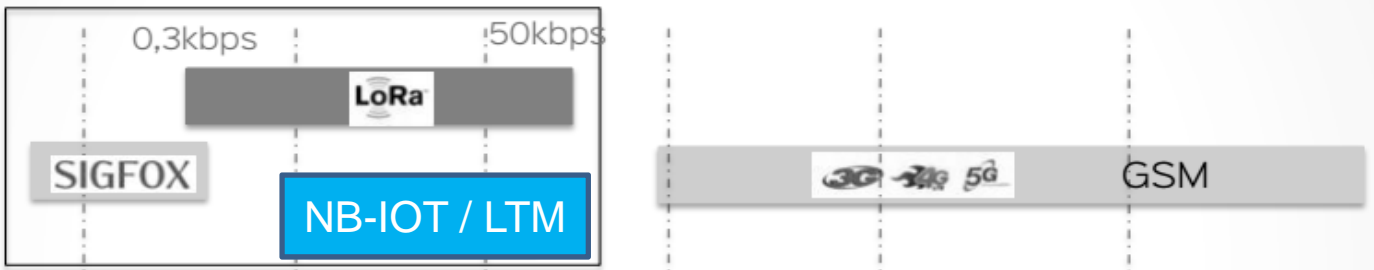
# IoT's Paradigm



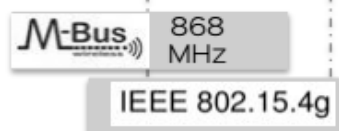
Power

LPWAN: LOW POWER WAN

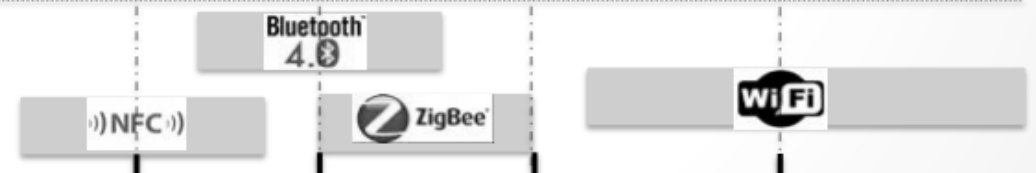
WAN  
Wide Area  
Network  
> kms



LAN  
Large Area  
Network  
100-500m



PAN  
Personal Area  
Network  
< 50m



100bps 1kbps 10kbps 100kbps 1Mbps 10Mbps Data rate









# Remote IoT

Remote Stations

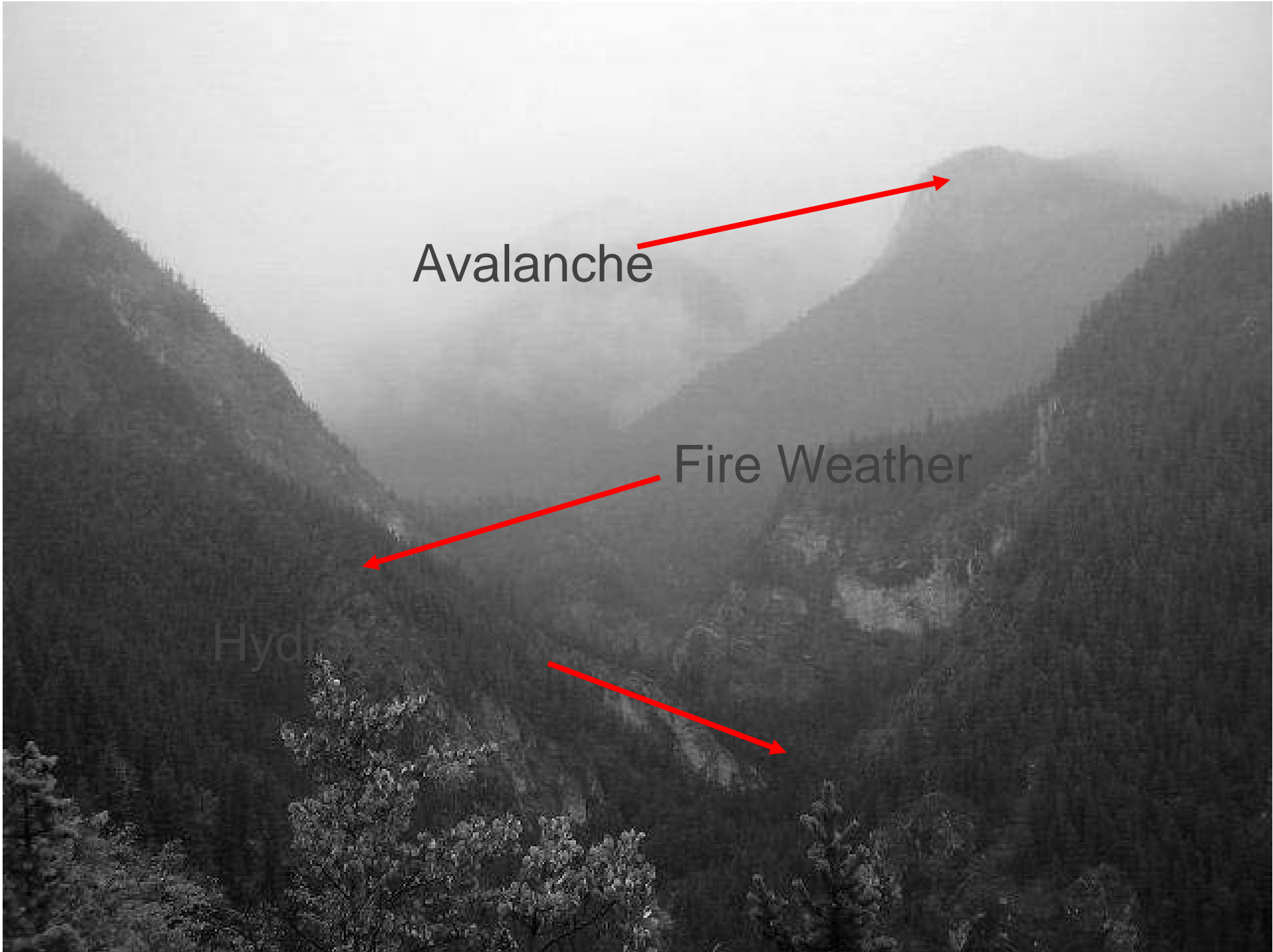


# Introducing Remote IoT Modems

- **Wireless Modems for SDI sensors...**
- **Self Powered, no infrastructure required**
  - **Up to 38aH of battery possible!**
- **Small footprint and easy to setup**
- **LOS – Self Healing Technology**
- **Based on LORA technology**
  - reliable and tested







Avalanche

Fire Weather

Hydro

## Highly Reliable, Cost-Efficient Remote Sensor Networks



**Low Power Consumption**  
Needs no recharging for years.



**All-in-One**  
Integrated radio, battery, power management, enclosure, mounting bracket—nothing else required.



**Wide Area Coverage**  
Up to 15km, up to 50km using repeaters. Up to 180 sensors in a single network.



**Reduced Complexity**  
Eliminate data loggers, solar panels, power managers, cables and use a single data uplink to the cloud.



**Simple deployment**  
Self-configuring, works right out of the box.



**Scalable**  
Add additional Motes, Repeaters or sensors as needed. Up to 10 sensors per Mote/slave, 6 Motes/slaves per repeater, 3 repeaters per network.



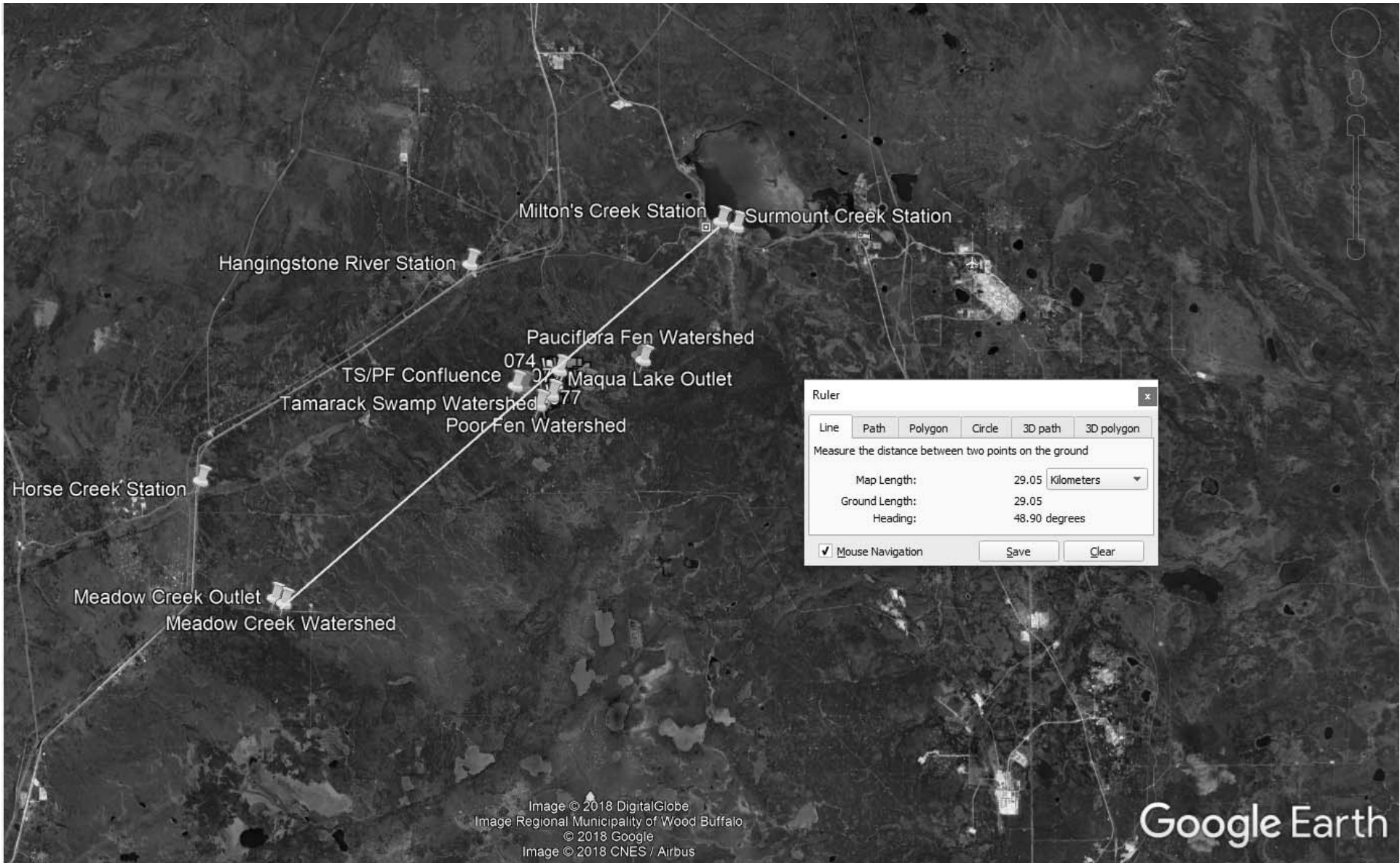
**Environmentally Rugged**  
IP67 rated, continual operation in even harsh Canadian winters, from -40°C to +75°C (-40°F to 167°F)



**Low Total Cost of Ownership**  
Reduced infrastructure requirements combined with quick and easy installation and little-to-zero maintenance keep overall ownership costs down.













# Remote Applications

- › Salt Dilution Streamflow Gauging
- › Construction Crossing WQ Monitoring
- › Remote Precip Gauges or Soil Moisture
- › Groundwater Mapping
- › Remove long sensor runs (from varmints!)
- › Disassociate station install from measurement points



# So how does this type of technology help?

- › ...”do more with less”...
- › ...budgets...
- › ...program justification
- › ...staff training and retention...





# Municipal IoT

Applications for Municipalities

# Municipal Monitoring - Currently

- Smart City trends are growing
- More and more applications are coming online and IT wants one single infrastructure
- Your area will be impacted by IoT
- How can IoT strategy work for your needs?
- A Municipality has hundreds of monitoring needs, they can't each have their own network...





# A Cities Needs Vary by Application and Location

Street Light  
Not Operating

Air Quality  
Poor

Stormdrain  
Warning

Garbage  
Container 80%

Basement  
Underwater

Meeting Room  
Empty

Water Level  
Alert

Window  
Open

Gas  
Leak



# Introducing Municipal Monitoring

- **Wireless LoraWan for Analog and SDI sensors**
- **Coverage anywhere you want**
- **Small footprint for rooftop gateway deployment**
- **Up to 40 Measurements per Mote**
- **Low Monthly Fee per Site**
- **Configurable Dashboard**



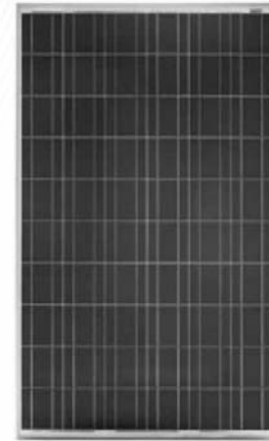
# Components



Gateway



Mote



Solar Panel



Trial Package





# Benefits

- Enable all existing analog and SDI-12 sensors (or new ones) on the same communications infrastructure
- No cell needed per site – equals savings
- In essence makes placing sensors, easier
- More and more sensors are being produced for IoT



# A couple other ideas...





# Open Ended Options

## Smart city

- Smart parking
- Traffic sensors & control
- Street lightning
- Infrastructure monitoring
- Trash & waste containers
- Public events- location service
- Advertising displays

## Smart metering

- Electric
- Water
- Gas
- Heat
- Infrastructure & production

## Smart environment & industrial

- Forest fires
- Air pollution
- Earthquake sensors
- Avalanche & flooding
- Heating and AC
- Equipment status
- Factory control



## Tracking

- Motorcycles, bicycles
- Cars
- Trucks trailers
- Shipping containers
- Kids, pets
- Insurance- valuable assets
- Find my stuff

## Agriculture

- Irrigation control
- Environment sensing
- Animal tracking
- Aniaml sensing - ovulation, birth

## Security / smart home

- Smoke detectors
- Security systems
- Smart appliances
- Smart heat
- Control / monitoring



# Finishing Up

- “Smart” technology will probably affect your monitoring programs
- There are pieces which can be of real benefit to your monitoring goals
- New paradigms of monitoring are coming, think outside the box.

