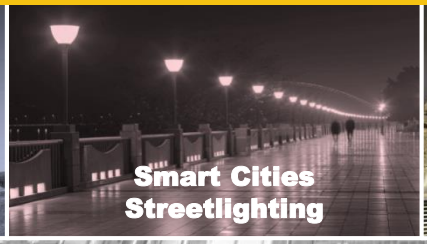
LonMark® International

Delivering Smart and Open Building Applications for the IoT



Speakers

Matthias Lürkens

- CTO Gesytec (Germany)
- LonMark
  - Board of Directors
  - Channel Standardization Committee
  - Web Services Committee
  - German Marketing Group
- DIN: CEN TC247

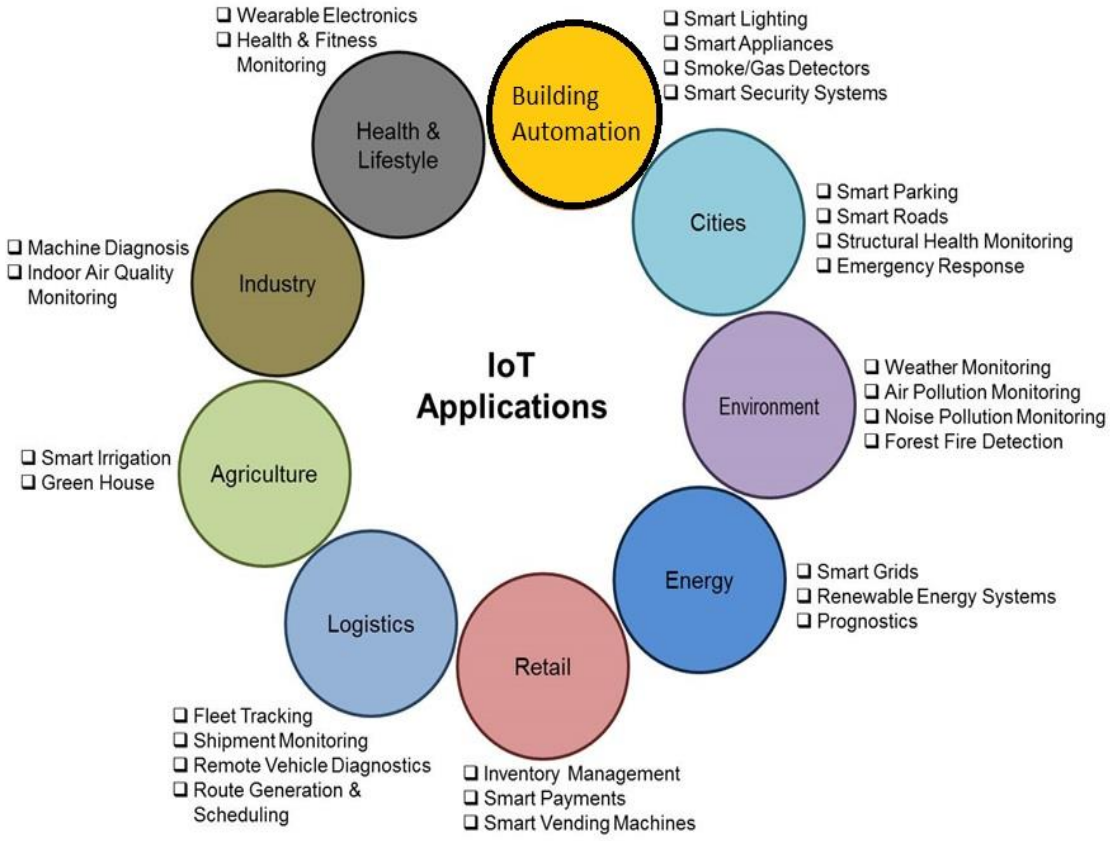
Rich Blomseth

- Product Management Director,
  Adesto Technologies, Echelon Division
- LonMark
  - Board of Directors
  - Channel Standardization Committee
  - Web Services Committee
  - Building Automation Systems Committee
- CTA: R7 Consumer Electronics Networking Committee

Agenda

- LonMark Web Services motivation
- IoT and cloud limitations today
- LonMark Web Services standardization
- Example use case—why BA only will fail
- IoT terms—MQTT, REST, and others
- LonMark Web Services overview
- Other Web service standardization efforts
- Cyber security
- How to participate

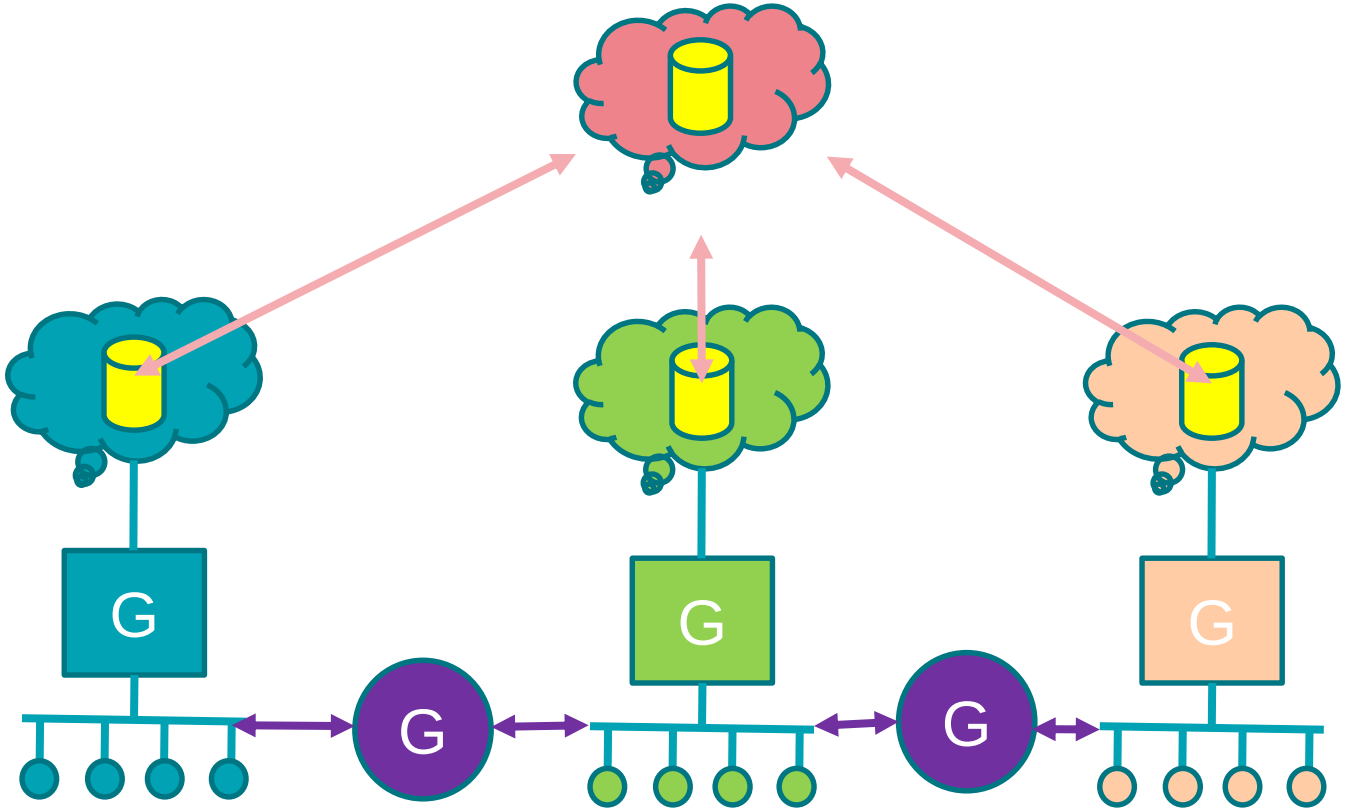
LonMark Web Services Motivation



- Leverage IoT services
  - Big data
  - Predictive analytics
  - Artificial intelligence
- Connect disjoint applications
  - In and outside of a building
  - Smart cities and smart grids
  - Industrial and commercial
  - Stay open minded

LonMark®

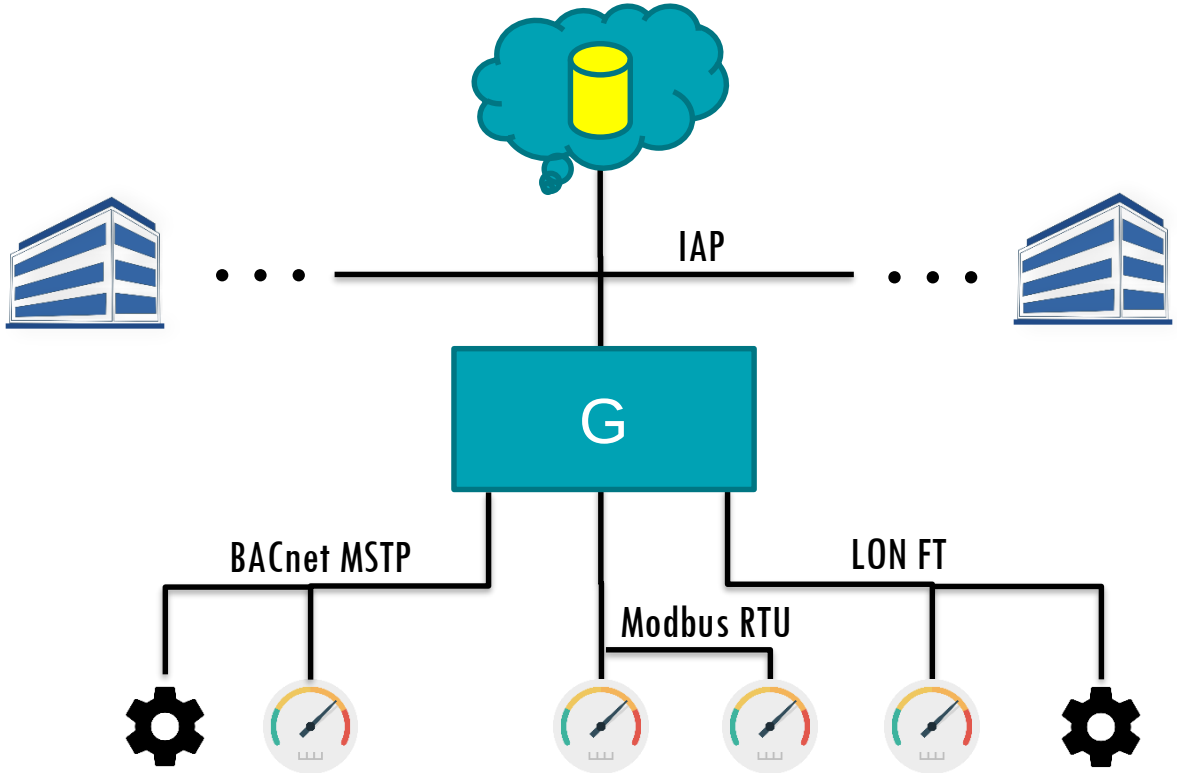
IoT and Cloud Limitations Today



- Tall silo
- Multiple datamodels
- Local/remote
- Latency
- Reliability
- Authentication
- Encryption

LONMARK®

IoT and Cloud with Standard Web Services



LonMark Web Services Standardization

Secure IoT messaging with MQTT and REST

Multi-protocol to the edge: LON, BACnet, Modbus, MQTT, and others

Provision and maintain devices

Connect datapoints

Access data in edge devices

Log and retrieve data

Set and manage schedules

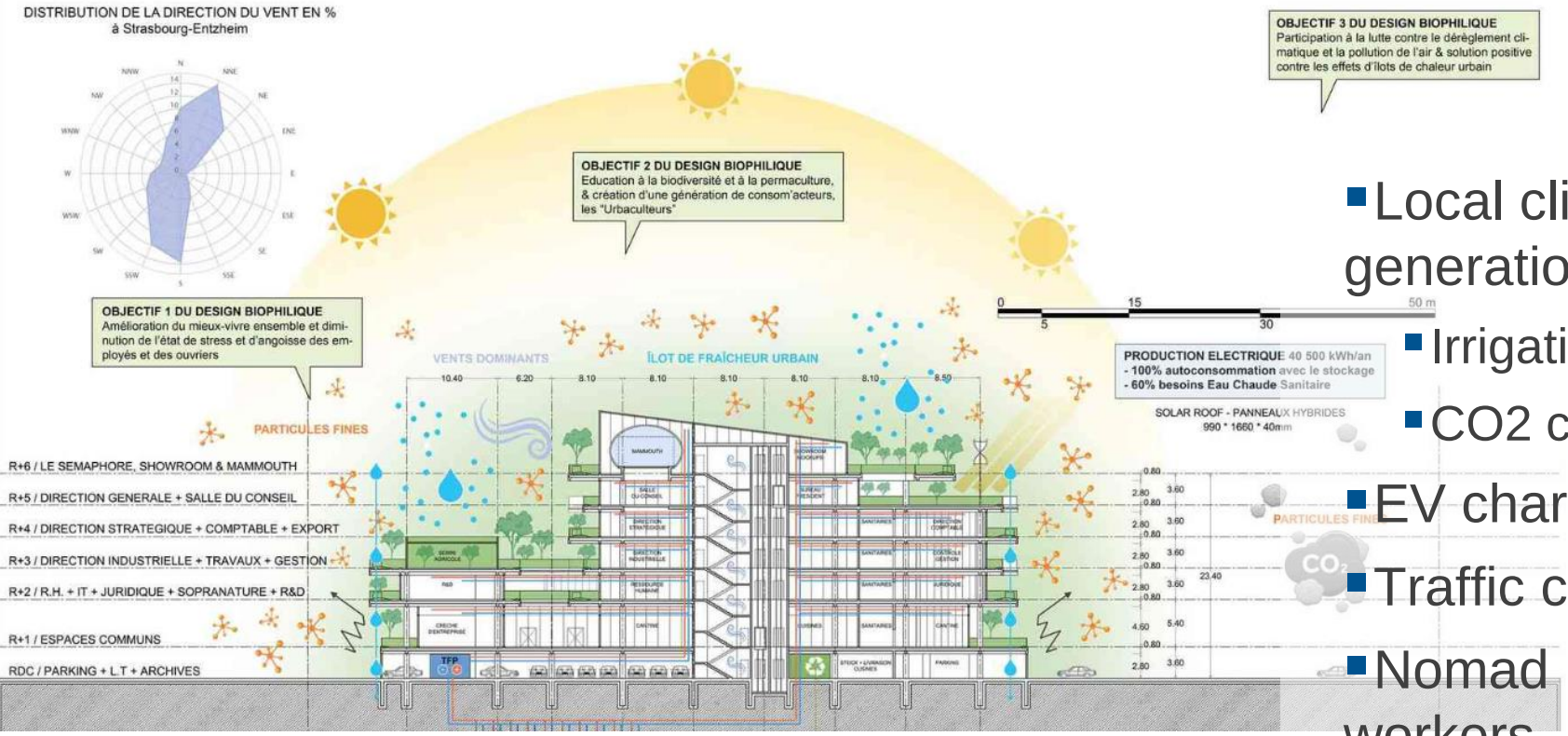
Monitor and manage alarms

- Open-standard APIs for:
  - Local, remote, and cloud services
  - Edge devices
  - Web pages
- Planned standardization
  - LonMark (in process)
  - ANSI/CTA (proposed work item)
  - CEN
  - ISO
- Other standards bodies
  - Building automation anthology
  - W3C

LONMARK®

Sonema Headquarters Strasbourg, France

Sonema Headquarters Strasbourg, France



- Local climate generation
- Irrigation
- CO2 control
- EV charging
- Traffic control
- Nomad workers

LonMark

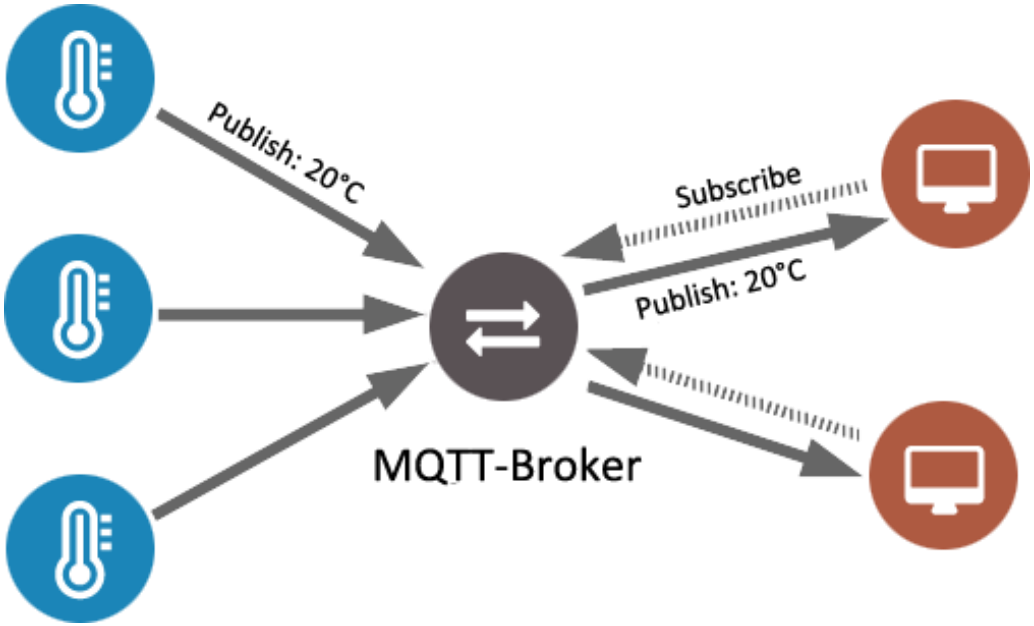
IoT Terms

- MQTT
  - Message Queuing Telemetry Transport
  - Various IP protocols possible
  - Publish/subscribe model
- REST
  - Representational State Transfer
  - HTTP PUT/GET/POST/DELETE
- JSON
  - JavaScript Object Notation


```
{
 "receiver": "8000000012",
 "data": [
  {
   "sn": "0000015441",
   "value": "22.18",
   "type": "Temperature",
   "rssi": "78",
   "quality": "100",
   "battery": "100",
   "timestamp": "2017-09-26T14:43:04Z"
  },
  {
   "sn": "0000007989",
   "value": "-19.57",
   "type": "Temperature",
   "rssi": "66",
   "quality": "100",
   "battery": "99",
   "timestamp": "2017-09-26T14:43:06Z"
  }
 ]
}
```


LONMARK®

Introduction to MQTT



- Any client can publish any message to any topic
- Any client can subscribe to any topic and receive messages tagged with that topic
- Other technologies with similar approach: LON NVs and Twitter

LONMARK®

LonMark Web Services Topics

- MQTT clients publish and subscribe to messages with *topics*
- Topics have the following format:

`glp/0/{Segment}/{Channel}/{Resource_Type}/{Edge_Protocol_ID}/{Handle}/{Object}/`

  - *Segment* – identifies an edge server
  - *Channel* – identifies a request (**rq**), feedback (**fb**), or event (**ev**) channel
  - *Resource_Type* – one of the resource types on the next slide…
  - *Edge_Protocol_ID* – identifies the protocol, initially one of:
    - LON (**lon**), Modbus (**mod**), BACnet (**bac**), or any other
  - *Handle* – identifies an addressable item
  - *Object* – identifies an object within the addressable item—may be multiple levels

- Datapoint example:

`glp/0/s1/rq/dev/lon/a/if/LightCntrl/0/nviLampValue/value`

LonMark®

LonMark Web Services Resource Types

Resource Type	Description
about	Segment information
alarm	Alarms
app	Apps
cfg	Segment configuration
conn	Connections
dev	Devices
discovery	Discovery

Resource Type	Description
ev	Events
evnt	Scheduled events
grp	Groups
job	Jobs
res	Resource Meta Data
sch	Schedules
sts	Segment status
super	Supernodes

LonMark®

Node.js Example Code to Write a Datapoint

```
let topic = 'glp/0/' + SID + '/rq/dev/lon/' + MyDeviceHandle  + '/if/TempController/0';
let payload = '{ "SP": { "value": 20 }}';
mqttClient.publish (topic, payload);
```

Example REST Request

- Enter the following in a web browser address bar:

```
https://192.168.123.228:8443/iap/devs/3/if/DisplayCtl/0/nviLine1msg/value/ascii/
```

Other Web Services

- BACnet
  - REST replaced SOAP
  - Building automation only
- KNX
  - 3 standards
- oBIX
  - SOAP and REST
- OPC UA
  - Industrial automation focused

- BA players discordant
- Other standards bodies
  - CEN TC247WG7 BA webservice anthology
  - W3C ?
- Smart City is more than BA
  - Web services need to cover much more than BA

IoT Security Considerations

- Focus to the user
  - The weakest link
- Use certificates instead of user/password
- IP protocols allow encryption and authentication
- Use TLS 1.3
  - No more RSA
  - e.g. ECDHE-ECDSA-AES128-SHA256
- Build up certificate architecture
- Use signed updates
- Use recommendations
  - NIST cybersecurity framework

How to Participate

- Join a LonMark technical committee
  - LonMark Web Services Committee
  - LonMark Channel Standardization Committee
- Monthly meetings developing new standards
- E-mail: tech@lonmark.org