Equipment Monitoring and Control Through Forge Viewer

Bandu Wewalaarachchi

AUTODESK. UNIVERSITY

About the speaker

Bandu Wewalaarachchi

A technical expert with extensive experience in software design and development, integrated solutions across SCADA, ERP, BIM and Cloud Services, in the fields of facility and infrastructure management, industry automation, BIM and enterprise software integration especially in the areas of smart workplace, smart cities, Internet of Things and mobility. Inventor of patented technologies.

Equipment Monitoring and Control Through Forge Viewer

- Objective – iViva Smart BIM as a use case
- IoT – where we are going
- Legacy devices and systems – where we are today
- Practical challenges and the opportunity
- Use an integration platform to simplify coding

Closer look at IoT

Advantages of IoT

- Individual devices are addressable hence they can loosely attach to systems
- Allows a single device to be part of multiple systems
- Promise of ‘do-it-yourself’
- Ability to do distributed processing
- Ability to self-report (many IoT platforms depend on this)
- Ability to self-diagnose and alert

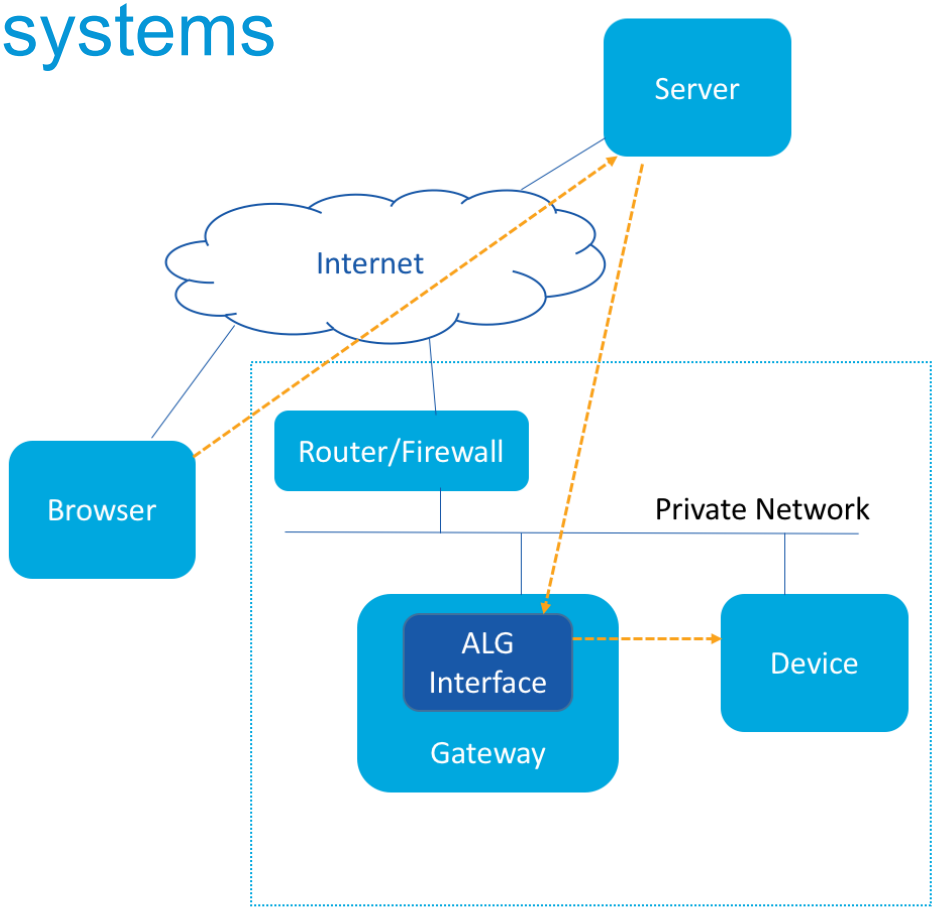
Challenges with IoT

- Security – validating host identification
- Security – validating device identification, certificate management
- Risk of Trojan-attacks
- High cost of devices

Legacy Devices & Systems

Legacy devices & systems

- Weak security – not meant for Internet facing
- Unable to verify host identification
- Safe architecture – behind Application Level Gateway (ALG)
- **Unable to self-report**



Monitoring Legacy Devices

- Multi-tier architecture
  - Sensor – converts physical properties into analog electrical signal
  - Field Controller – bridges analog & digital communication
  - Group Controller – enables standard protocols over IP networks
- Limitations of Group Controllers
  - Single controller represents many devices
  - Payload is limited – segmentation is required
  - ’Breathing space’ in between requests – larger turnaround time
  - Should standby to process control commands

Case Study

- Multi-building project in Australia
- 528,000 real-time points
- 52 gateways hosting 330 virtual machines carrying interfaces
- 375,000 bacnet points in 6,250 group controllers
- Large controller carrying 1,000 points
  - Needs 2 seconds turnaround time for 4-points query
  - 8 minutes to loop through all points
- Smallest carrying 50 points need 25-seconds turnaround time

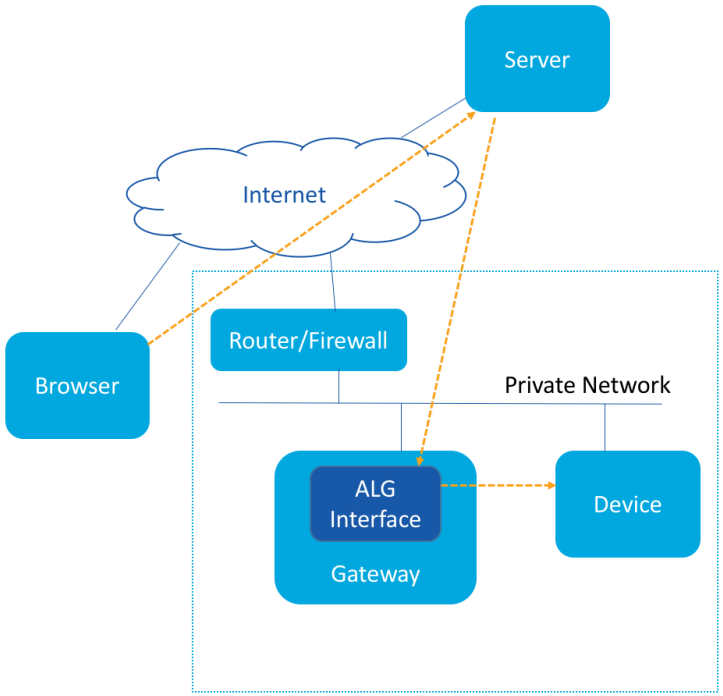
CoV (Change of Value) notifications

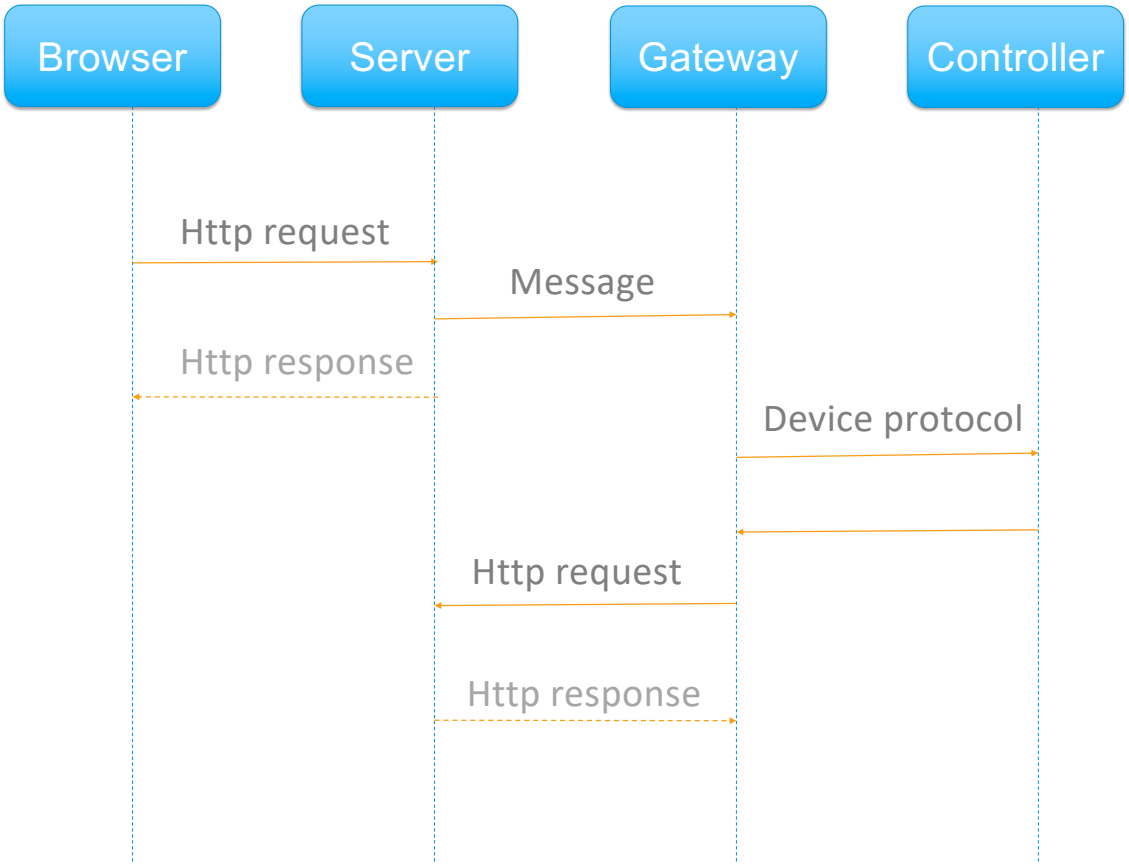
- To be supported by the communication protocol (bacnet, OPC)
- To be supported by Group Controller
- Limited subscription space – not all points can be monitored
- Downtime of the controller could be masked
- Unclear boundary of responsibilities
- Not widely used in large solutions

On-demand real-time communication

- Purpose of real-time monitoring
  - User needs to see current status
  - Background evaluation of alarms
  - Historical data collection – energy, average temperature, people count, etc.
- On-demand real-time communication
  - Only solution for large projects
  - Request controller to query device and return data

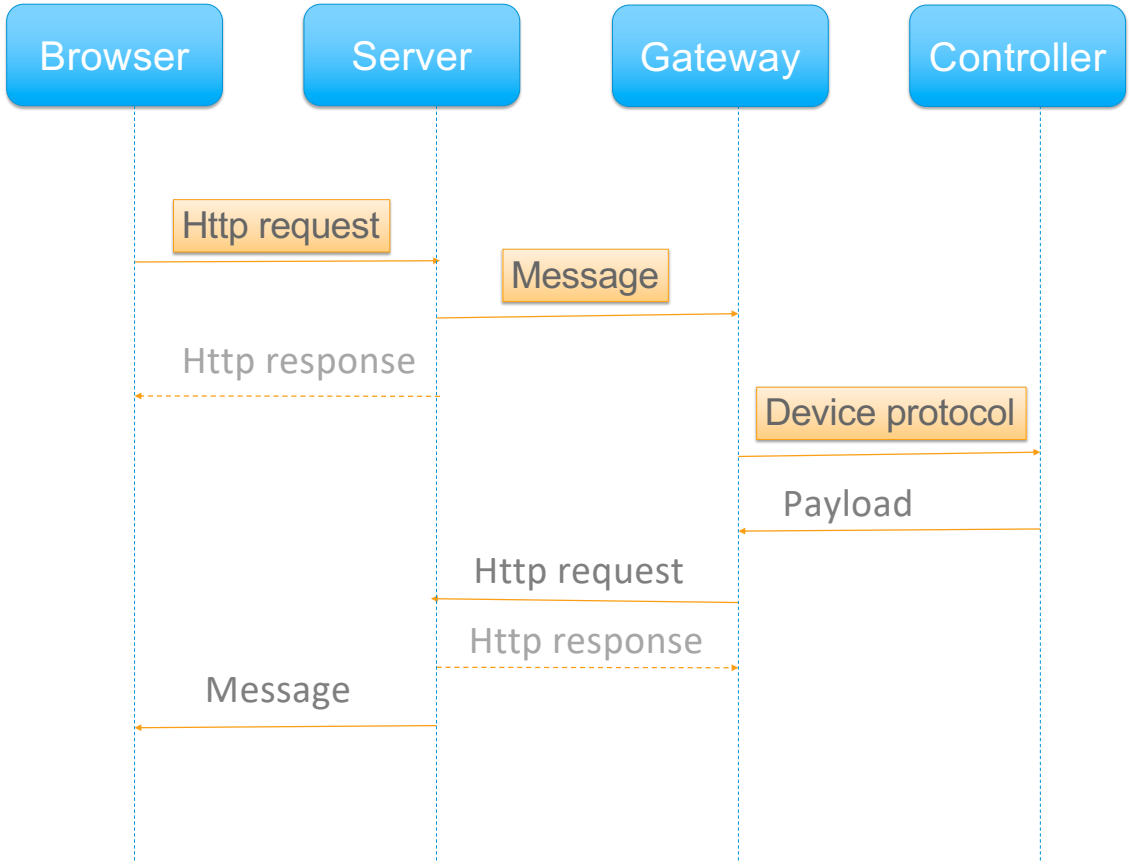
Real-time data request and response





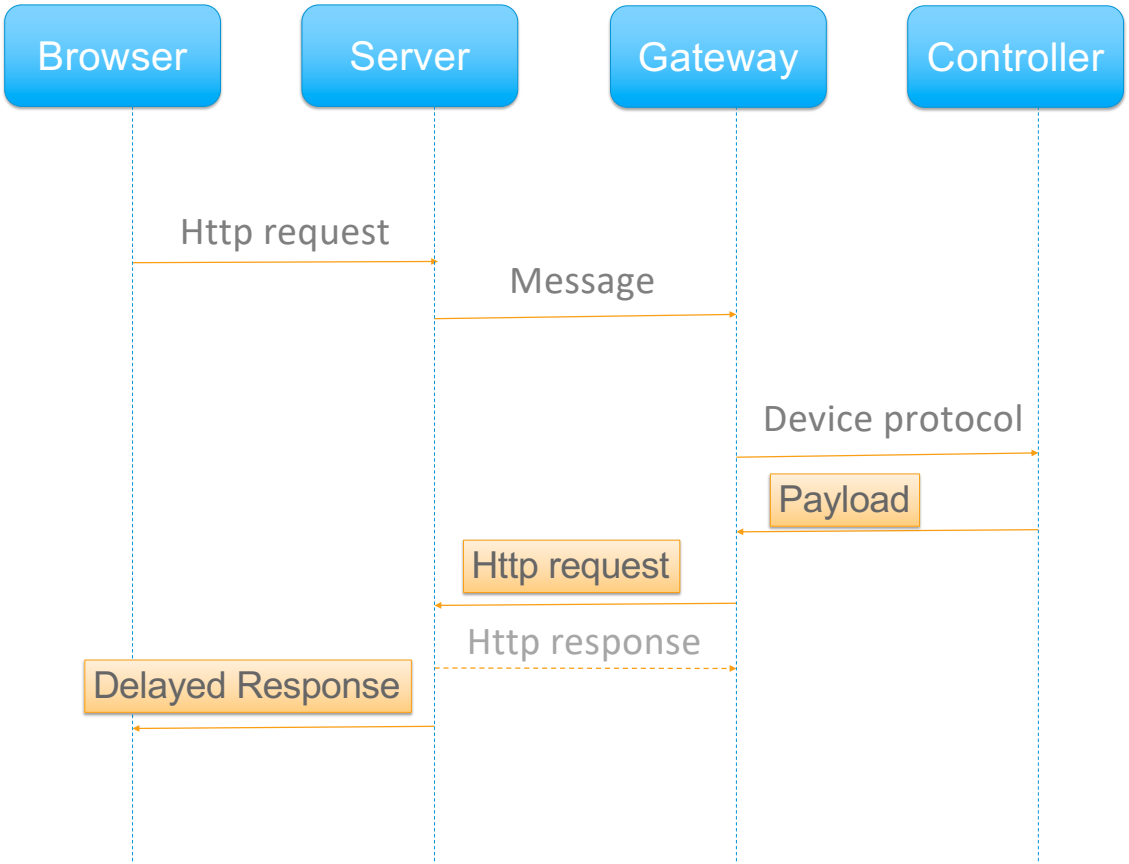
Real-time data request

- Components
  - Browser – Forge Viewer
  - Server – iviva Lucy
  - Gateway – Node.js script
  - Controller – Philips Hue
- Server -> Gateway -> Controller
- Browser -> Server



Real-time data response

- Browser sends the request to Server
- Server holds the http call
- Server delivers the message to the Gateway
- Gateway sends payload to Server
- Server returns http response to Browser



Simplify coding with an integration platform

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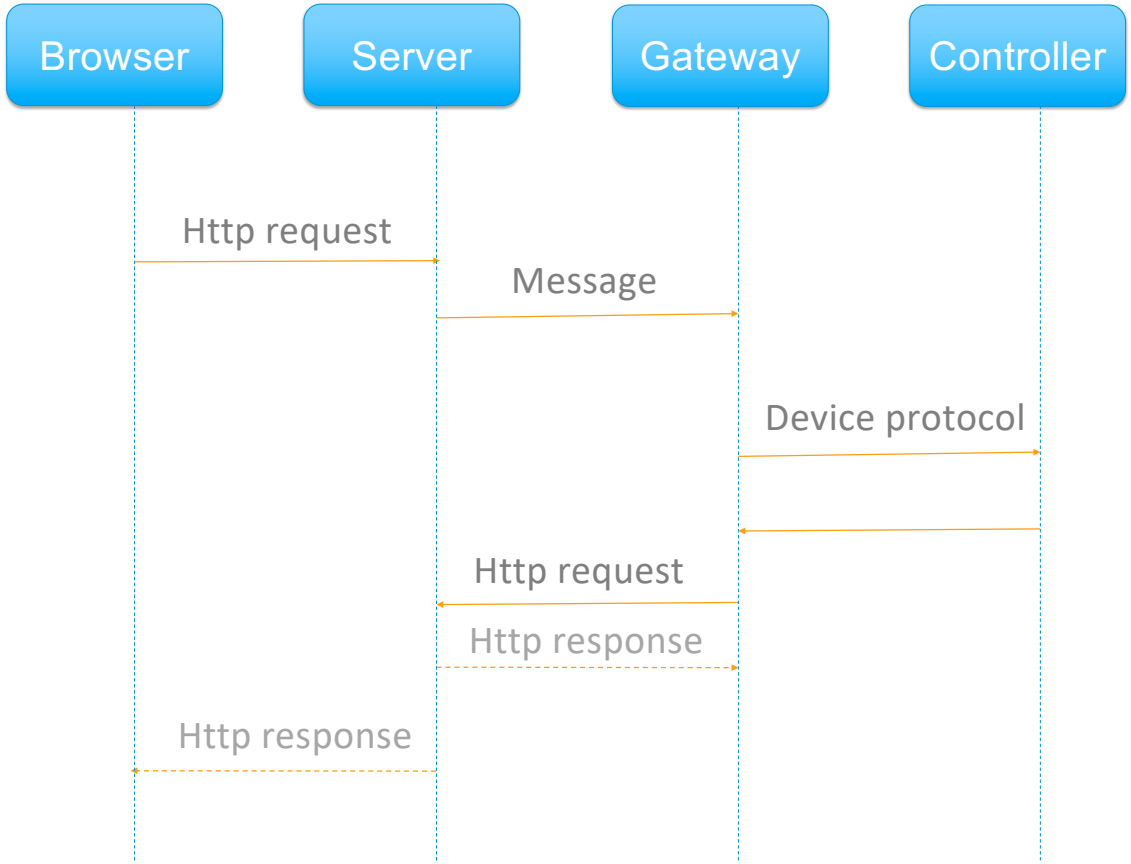

Summary

IOT IS FUTURE BUT LEGACY DEVICES AND SYSTEMS ARE NOT GOING AWAY YET

Understand what it takes to communicate with legacy devices and systems.

UNDERSTAND SECURITY CONCERNS AND POSSIBLE SOLUTIONS

Be aware of limitations and challenges hence realize the opportunity for service providers.

HOW TO BUILD REAL-TIME COMMUNICATION BETWEEN BROWSER AND DEVICES

This can be done with existing solutions in the market. Choose the right communication architecture and the tools.