

# IPv6 over Bluetooth for Power Affluent Devices

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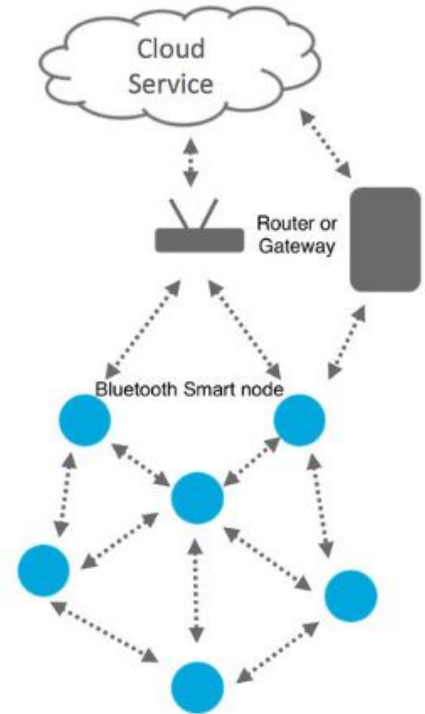
Tejas Sankpal: NITK Surathkal

**IEPG, IETF 120 @ Vancouver CA**

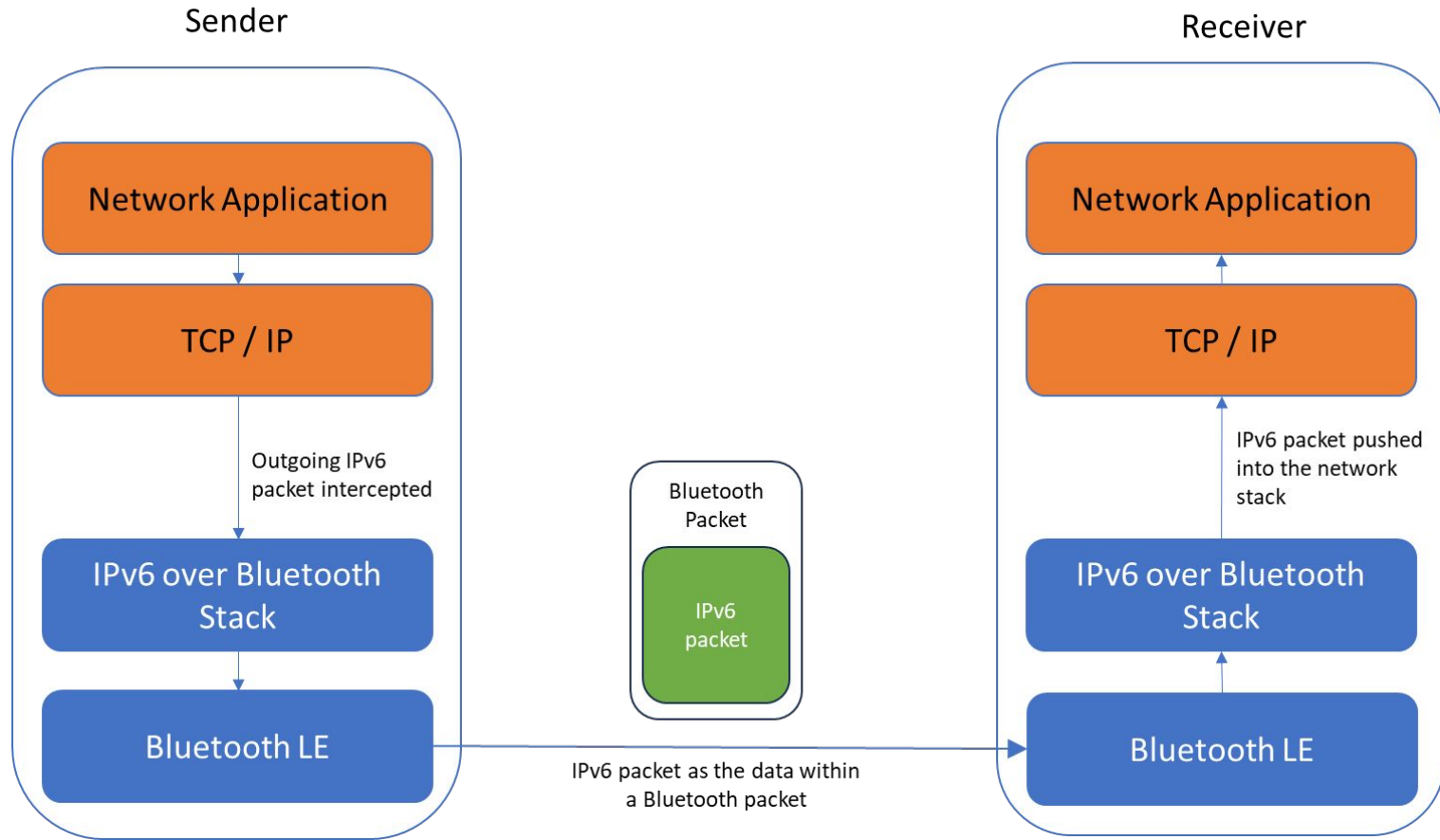
# Overview

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- IPv6 over Bluetooth enables the extension of the low powered interface of Bluetooth to utilize the features of IP.
- It has been confined to communication in IoT networks.
- We discuss its use for power affluent (i.e, not resource constrained) devices to achieve connectivity during Internet failures.



Credits: <https://embeddedcomputing.com>



**Figure 1. A pictorial description of IPv6 over Bluetooth**

# Use Cases

## 1. Disaster recovery

### Problems faced and need for communication

- Disasters often disrupt traditional means of communication, such as the Internet, phones and cables.
- Establishing connectivity between devices becomes critical for coordination, rescue efforts, and communication with survivors.



# Use Cases

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## 1. Disaster recovery (contd.)

### Benefits

- IPv6 over Bluetooth offers a low cost solution for Internet resiliency.
- Small to medium-sized communities, small groups (such as universities), or individuals who wish to have backup communication capabilities can rely on this technology.

# Use Cases

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## 1. Disaster recovery (contd.)

### Implementation aspects

- As described by RFC 9159, devices can take up roles similar to a node, router or both.
- If and when some devices gain access to the Internet, they can act as border routers to provide connectivity for other devices.

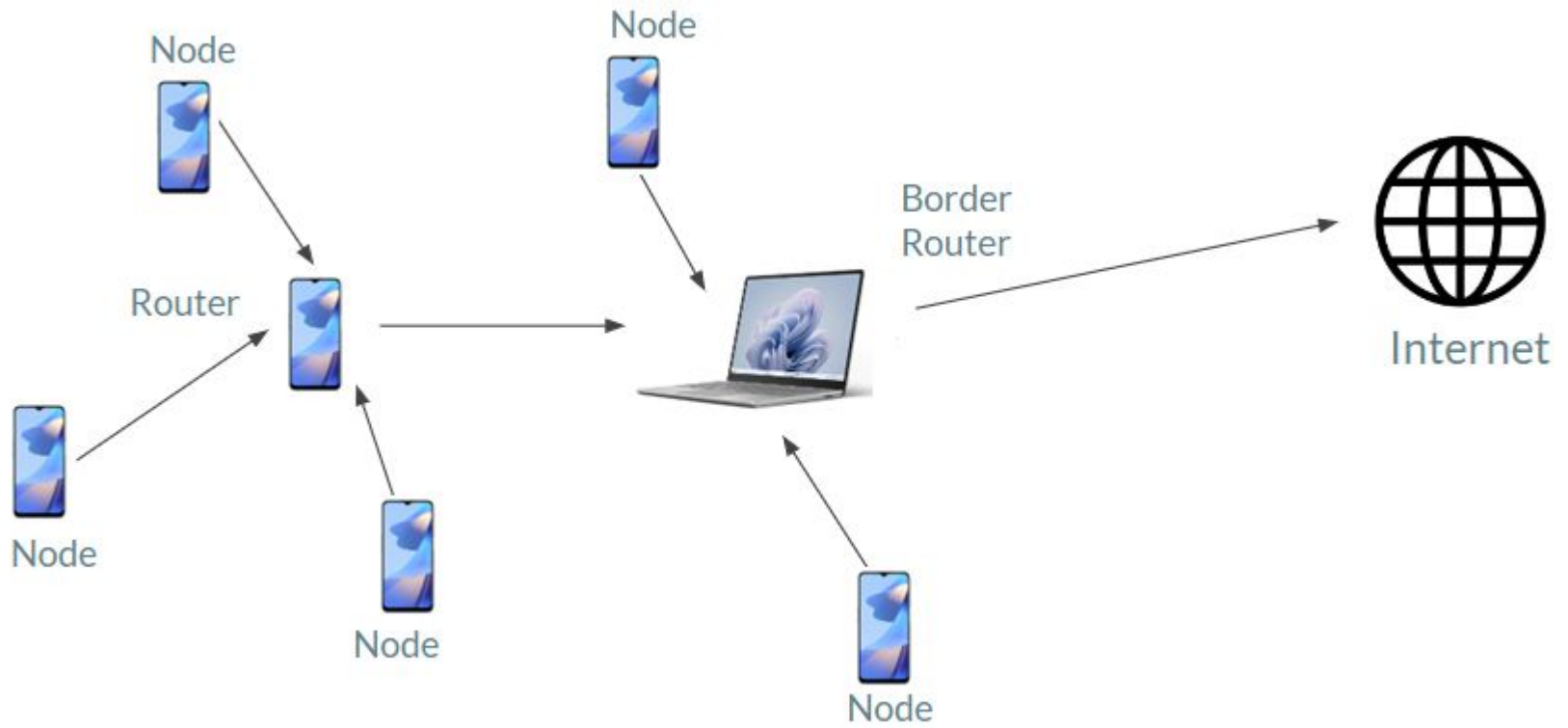


Figure 2. IPv6 over Bluetooth network consisting of nodes, router, and a border router

# Use Cases

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## 2. Chat applications

- Bluetooth chat gained prominence through Bridgefy during the Hong Kong protests when the Internet was shut down.
- In an IPv6 over Bluetooth network, messages can be sent to devices over multiple hops across the network.

## 3. IoT Gateways

- IPv6 over Bluetooth can be used in IoT networks wherein multiple IoT gateways communicate with each other and a central router, as a fallback mechanism.



# Use Cases

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## 4. File sharing

- With improvements in Bluetooth range and speed in the newer versions, IPv6 over Bluetooth can be used for file sharing in local networks.

## 5. Local network notifications

- During Internet unavailability, IPv6 over Bluetooth can be used to broadcast information or updates to people in a local area.
- This can include weather updates, event notifications and so on.

# Use Cases

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## 6. Data Backup

- During early stages of a disaster with low signal strength, IPv6 over Bluetooth can be used to back up crucial data.
- Data can be backed up either on multiple devices in the network or designated devices. Devices with Internet access, can also backup the data on the Internet.

# Overview of Implementation Tested on Windows

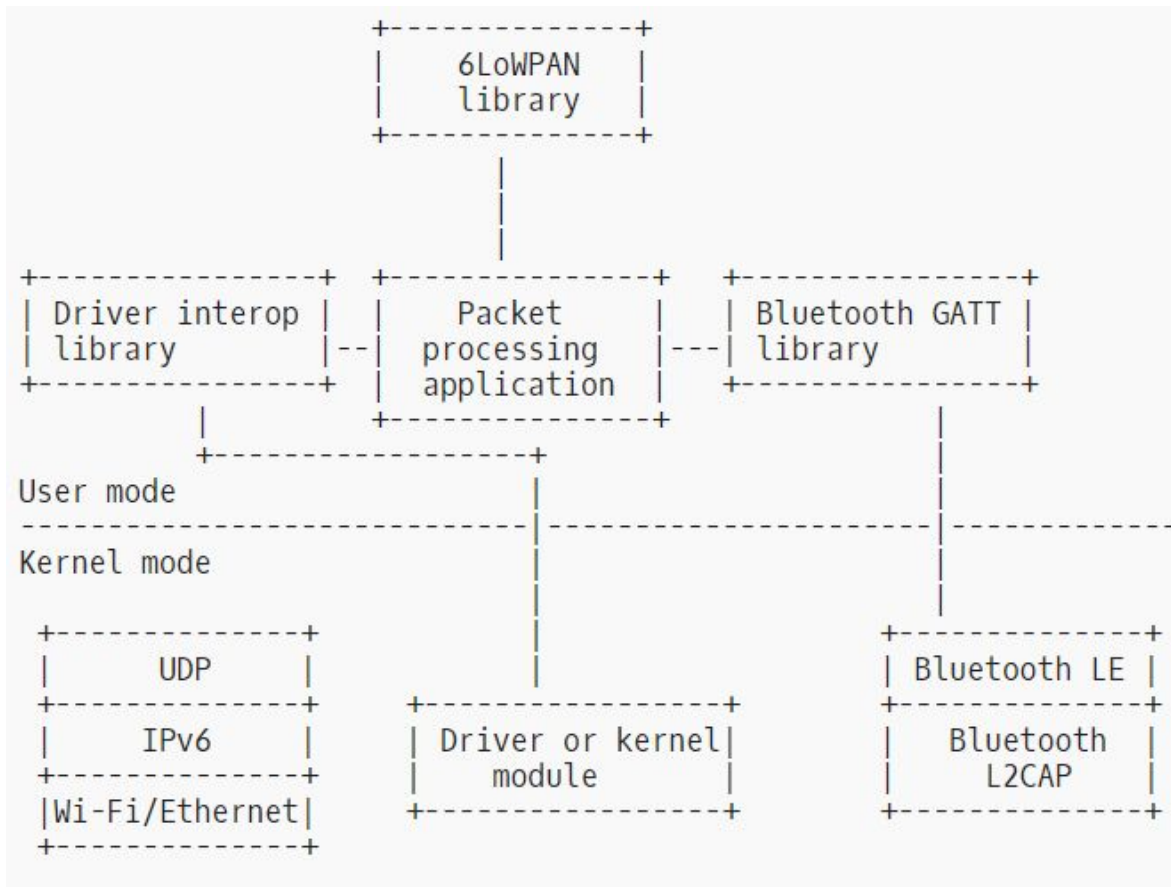
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## Components

- A driver or module to intercept IPv6 packets and send them over Bluetooth, and push IPv6 packets from Bluetooth into the network stack
- A packet processing application to interact with the driver, obtain device address, and find nearby devices.

## Libraries

- A driver interoperability library
- Bluetooth GATT library with the ISPS service
- A 6LoWPAN library for header compression and decompression (optional).



**Figure 3. Components of an IPv6 over Bluetooth implementation**

# Requirements for an IPv6 over Bluetooth network

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1. An IPv6 over Bluetooth driver or module
2. An application to facilitate conversion of IPv6 packets to Bluetooth and vice versa
3. Configuration of a border router and a program for routing packets (operating systems such as Linux has this inbuilt).
4. Addressing mechanism to uniquely identify each device in the network.

# Conclusion

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- IPv6 over Bluetooth can be a viable solution during cases of Internet unavailability.
- It can be useful in disaster areas, chat applications, file sharing, IoT gateways and local network notifications.
- A common set of guidelines and implementation details can be useful during development on different platforms.
- A few security and implementation details need to be considered.

Thank you