# XENO: The Personal Crowdsourced Bodyguard

## XENO: CONCEPT & GOAL

- XENO is a wearable device camouflaged as a women's accessory that can potentially save a woman in distress in the shortest possible time.

- World's first crowdsourced women's safety device that uses a network of anonymised peers (gig workers) to be the First Responders.

- Blockchained for safety and security.

- Maintains privacy & anonymity of the victim as well as the first responders using a novel decentralized P2P network & also ensures financial rewards.

- Integrated with BLE5 mesh-networking that solves the last mile connectivity problem.

- The main goal of the XENO is to ensure a safer world for woman by ensuring the privacy and anonymity of the victim as well as the first responders.
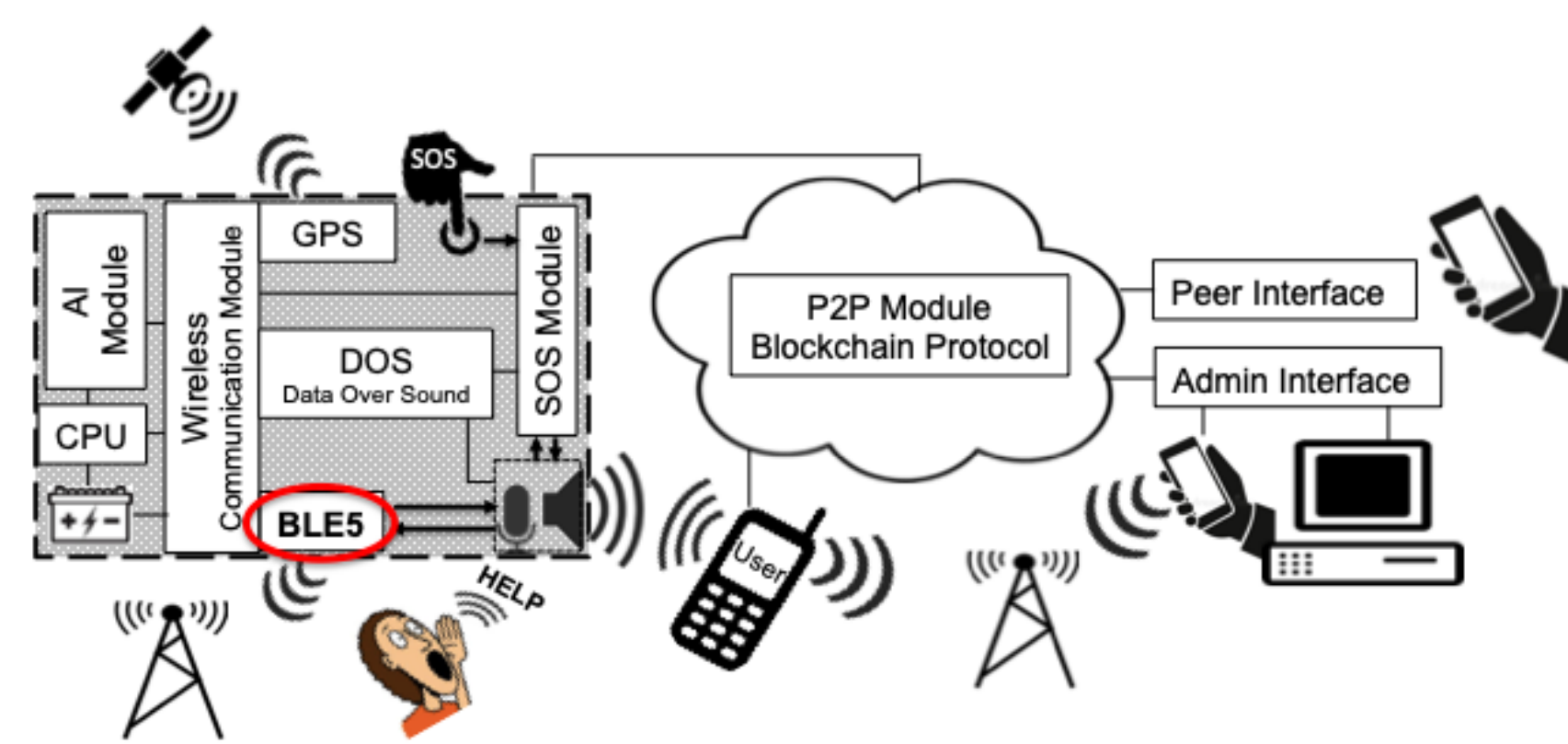
## XENO: FUNCTIONS

- XENO is connected with a companion mobile application using Bluetooth.

- When triggered with voice command, it broadcasts the SOS signal that can reach the network of first responders connected to the XENO community using internet.

- The device is uniquely capable of working even in the most adverse conditions of multiple network connectivity failures by utilising its BLE5 mesh-networking capabilities to communicate with the crowdsourced FRs/peers in victim's vicinity.

- BLE mesh-networking protocol uses the available BLE signals to carry forward (hop) the SOS message triggered by the device, and ensures that it reaches a peer BLE device that has an active internet connection and broadcasts the SOS message over the internet.

- Once SOS message is broadcasted, it can be received by a gigworker/FR in the closest vicinity of the woman in distress.

## CHALLENGES & EXPERIMENT

XENO originally comprised of a GPRS module for communicating with the adjacent peers.

- Drawbacks of the old design:
    1. Reduced battery life
    2. Recurring telecom cost



**XENO Network Architecture** Old



**XENO Network Architecture** New

The new design of XENO comprised of :

1. BLE5 module in place of the GPRS module to make the device battery last longer and to save the user from the recurring telecom cost.

1. The main objective of the experiment is to integrate the BLE5 module in place of GPRS to extend the battery life and make it free of any recurring telecom costs.

2. To test the BLE5 mesh-networking capabilities to communicate with the crowdsourced FRs/peers in victim's vicinity in most adverse conditions of multiple network connectivity failures.



1. Power button/SOS
2. Microphone
3. Micro USB port for recharge
4. Speaker
5. Back light

65MM

## DEMO SETUP

- We used distributed Bluetooth of nodes of w-ilab.t (imec) testbed for testing the BLE meshnetworking capabilities of the XENO hardware.

- w-iLab.t testbed is composed of two separate deployments a few 100meters apart, of which one deployment i.e. wilab1 is equipped with Bluetooth devices.

- The w-iLab1 had 38 nodes on the 10th floor and all nodes had BLE as well as WiFi modules and we used this floor to conduct the experiment.

- The node arrangement is as follows:



Note : Maximum distance of two nodes will be 31.6Meters
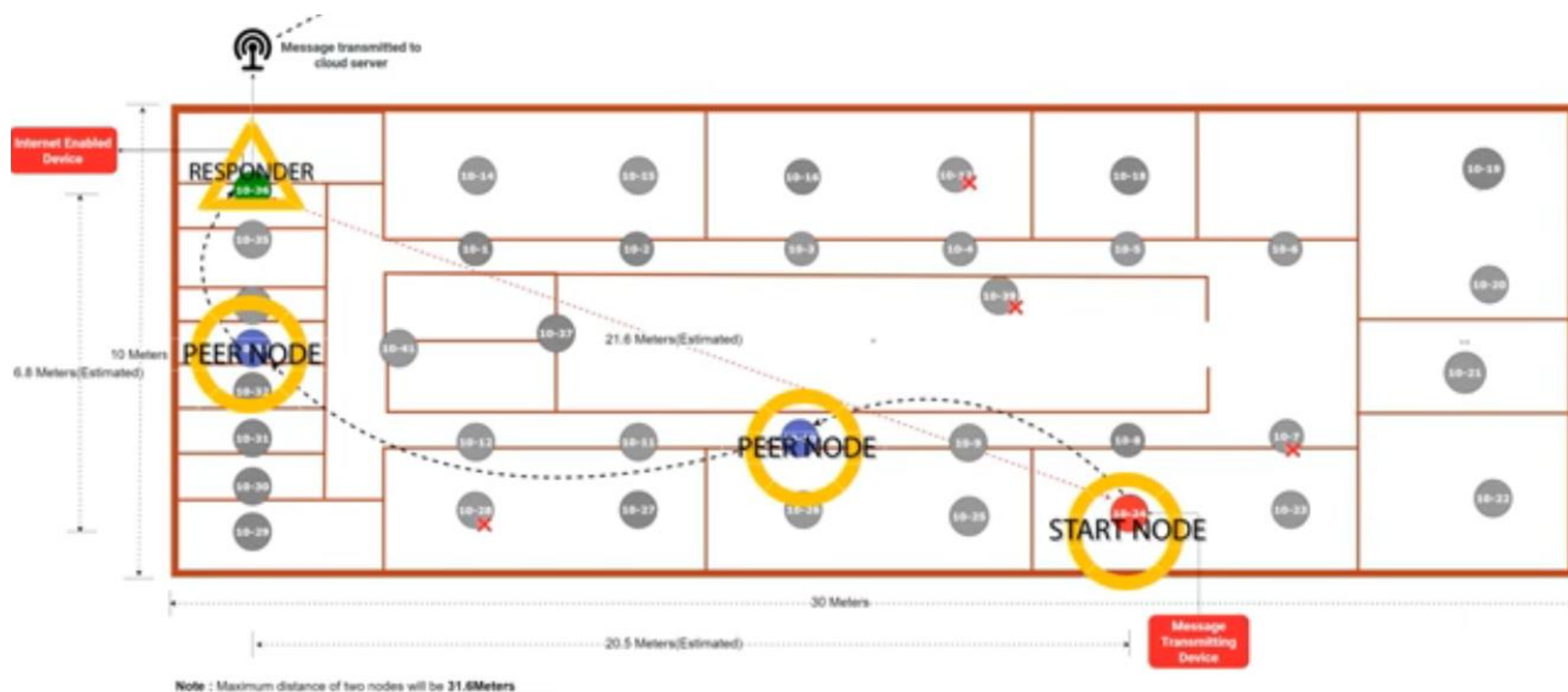
## DEMO SET UP

The experiment was conducted by developing and Installing the BLE5 mesh-networking scripts at pre-selected nodes of the w-iLab.t (imec) testbed and designated them either as:

1) **Sending BLE Node or the First Node** with no Internet connectivity that generates and sends the SOS signal to the peer nodes or intermediate nodes in the vicinity of the sending node,

2) **The Broadcasting or the Last Node**, which is furthest in the BLE mesh, but not within the transmission range of the First or Sending Node. The last node is connected to the Internet and capable of broadcasting the SOS message to the Internet.

3) **The Intermediate or Peer Nodes** that are not connected to the Internet but are located between the sending node and the receiving node.

## RESULT

1) One BLE node located at one end of the testbed facility successfully delivered the message to the farthest BLE node at the other end of the testbed facility using the Bluetooth mesh-networking protocol (scripts) installed on the intermediate transmitting nodes.

2) Successful propagation of a "Help" request from a simulated source node to an internet connected final node (out of range) with the message relayed by other nodes in the vicinity validated the utility of Bluetooth meshnetworking in last mile connectivity in absence of internet, GPRS and other direct network communication, in an SOS situation.

## CONCLUSIONS

The experiment clearly demonstrated that nodes simulating XENO device can propagate any SOS message in absence of any other means of communication like GPRS or WiFi, using BLE mesh networking protocol via data hopping through the BLE devices present in the vicinity until it reaches a device that's connected to the Internet.

## POST MORTEM

XENO concept technologically innovates at three levels to deliver a broad enabling technology platform:
1. Develop test and validate always-on BLE5 mesh-networking to solve the last mile telecom problem existing in most emergencies.
2. To decentralize P2P network of peers for ensuring privacy & anonymity of the victim using a low latency, low cost network architecture.
3. To guarantee an automated financial reward to the crowdsourced FR for rescuing the victim via an immutable smart contract that can never be changed or tampered with.
In stage 1, company successfully accomplished the first objective by developing integrating, testing and validating XENO's BLE5 mesh-networking protocol in the current PCB design of the device using the w-iLab.t (imec) testbed. The next task for the company would be to accomplish the remaining 2 tasks, utilising our blockchain expertise.