



Review Open Call 9: Stage 2

XENO: THE PERSONAL CROWDSOURCED BODYGUARD

Blockchain 5.0 OÜ
w-iLab.t (imec)

FEC9
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XENO

**THE PERSONAL
CROWDSOURCED
BODYGUARD**

Concept: What is XENO?



- A wearable device, camouflaged as a women's accessory that can potentially save a woman in distress in the shortest possible time.
- Consists of a hands free voice trigger & voice recognition AI/ML module and can be prompted to work with just a voice command.
- 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.
- Works on a smart contract that ensures a financial reward to the crowdsourced FR for rescuing the victim.
- Integrated with BLE5 mesh-networking that solves the last mile connectivity problem.
- Disruptive platform with broad cross-sector applicability.

Objectives of the Experiment



Novelty of XENO solution can be attributed to 3 aspects:

First: Always-on BLE5 mesh-networking solves the last mile telecom problem.

Second: Victim's privacy & anonymity via a novel decentralized P2P network.

Third: A smart contract that ensures financial reward to a crowdsourced rescuer for rescuing a victim in distress.

Objectives:

1. Testing the XENO hardware and the system process flow
2. Testing the Blockchain based backend infrastructure to ensure privacy & anonymity
3. Designing & deploying novel P2P smart contracts to deliver variable rewards to the rescuers
4. Testing the last mile connectivity of the XENO device

Background & Motivation for the Experiment



- XENO features make it a technology that has potential to disrupt not only the FR industry but enable a broad cross-sector applications.
- The diverse cross-sectoral applications of XENO involve the sensitive personal data and hence the privacy and anonymity of the user as well as the rescuer becomes of paramount importance. (*The blockchain based backend infrastructure*)
- XENO is an innovative solution that for the first time deploys omnipresent gig workers (ride hailers, food deliverers, etc.) as crowdsourced first responders (FRs).
- It converges the rapidly growing gig or crowd work economy with FR industry. Thus, the success of the XENO ecosystem largely depends on adopting a transparent & responsive reward mechanism. (*The P2P smart contract reward mechanism*)

Experiment Set Up: Overview



Stage 2 experiment was designed for 2 specific goals:

- i) To design backend infrastructure based on Blockchain for ensuring privacy & anonymity of the victim as well as the rescuer.
- ii) To guarantee an automated financial reward to the crowdsourced FR for rescuing the victim via an immutable P2P smart contracts.

Initial proposition was to to perform the full experiment using android phones and testbed nodes, but the current COVID-19 situation enforced us to perform this with 2 different set of experiments:

1. Test the blockchain based backend infrastructure and the reward ecosystem with XENO mobile application run over android phones.
2. Test the last mile connectivity of the XENO with BLE meshnetworking scripts installed over the w-ilab1 testbed nodes .

Experiment set-up: 1



To test the XENO process flow, backened infrastructure & reward ecosystem using XENO android application installed over phone;

- 2 volunteers from the associated testbed w-ilab.t were selected.
- They were assigned the following roles;
 1. **User/Victim:** One of the volunteer who was given the XENO device was asked to create the SOS request.
 2. **Rescuer:** The one with the XENO application and located at a considerable distance from the Victim's location.
- Both of them were made to download the XENO mobile application.
- A situation was created in a sense where one of the volunteer was asked to create an emergency situation while the other was notified, prompted to address and rewarded with the successful addressal of the event.

Video Demonstration 1



Experiment Set Up: 2



To test the last mile connectivity of XENO using BLE mesh script installed over the w-ilab1 testbed nodes:

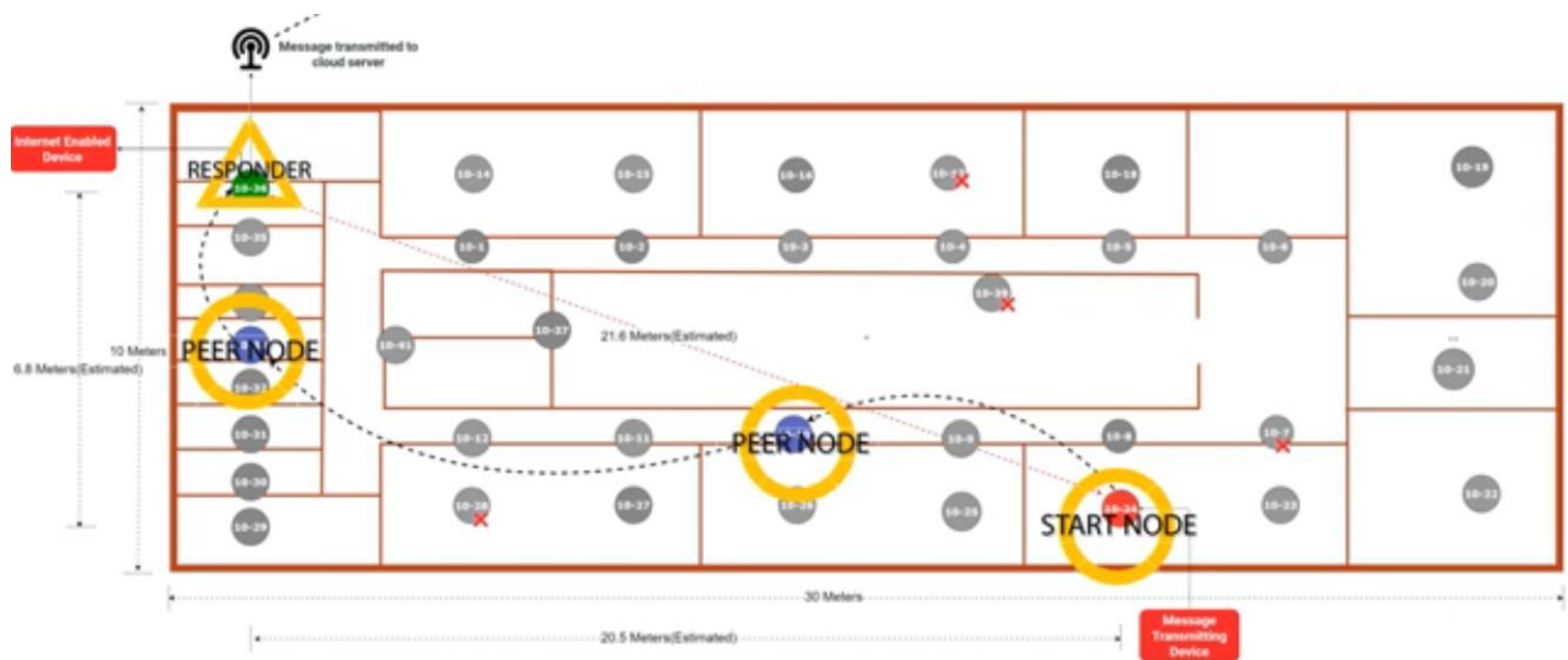
We used distributed Bluetooth of nodes of w-ilab.t (imec) testbed for this purpose.

The w-iLab1 had 38 nodes on the 10th floor and all nodes had BLE as well as WiFi modules, out of which 4 nodes were selected & assigned the following roles;

- 1) **Sending BLE Node or the First Node (Node24)** 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 (Node 36)**, 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 (Node10 & 33)** that are not connected to the Internet but are located between the sending node and the receiving node.

The BLE mesh script was installed over the selected nodes to transmit the SOS signal from first node to the last node with Bluetooth signal only to demonstrate the last mile connectivity of the XENO software in the absence of any other mode of communication.

W-ilab1 Node Set Up



Note : Maximum distance of two nodes will be 31.6Meters

Video Demonstration: 2



ikram101@node24: ~
ikram101@node24:~\$ node adv.js

ikram101@node10: ~
ikram101@node10:~\$ node scan.js

ikram101@node33: ~
ikram101@node33:~\$ node scan.js

ikram101@node30: ~
ikram101@node30:~\$ node scan.js

ikram101@node36: ~
ikram101@node36:~\$ node final.js

DVDVideoSoft.com
Free version

XENO
Not secure | 18.191.6.154/inde...
XENO SERVER DATA
Clear all data

#	User Name	Timestamp
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Activate Windows
Go to Settings to activate Windows.

Project Results



The focus of stage-2 was to set up the backend network infrastructure to create a network that's secure, private and incentivizes peer participation with rewards to rescuer for every rescue mission.

The stage 2 objectives were achieved;

1. By successfully demonstrating the XENO hardware functionality to generate the SOS signal when prompted with the voice command.
2. By successfully demonstrating the functions of the XENO companion mobile application based on Blockchain technology to ensure privacy and security of both the user and the rescuer.
3. By designing and deploying a novel P2P smart contract system that delivers pre-defined rewards for every rescue action.
4. By testing the last mile connectivity of XENO software using w-ilab1 testbed nodes.



Experiment Results



Experiment 1:

- Successfully demonstrated the Blockchain based Backend Infrastructure of XENO ecosystem that ensured privacy & anonymity of both the victim & the rescuer.
- It also demonstrated the successful deployment of novel P2P smart contract ecosystem by delivering rewards to the rescuing peers in a most transparent manner.

Experiment 2:

- The successful transmission of SOS signal generated at one testbed node to the farthest node, in the absence of any other mode of communication, demonstrated the last mile connectivity of the XENO software.
- This validation of our experiment proved to be pivotal in formulating the design and architecture of our complete XENO solution.

DISC Protocol: A Serendipitous Discovery



- The serendipitous discovery of DISC (Dynamic Immutable Smart Contract) during the experiments was one of the main findings of the stage 2 experiment.
- DISC introduces dynamism to the Blockchain Smart Contracts without hampering its immutable nature.
- Although the DISC concept was neither hypothesized nor conceived in the original proposal, it was a chance finding that came to light because of the need to vary the rescuer rewards.
- The successful deployment of DISC protocol ensured the transfer of predefined rewards to the rescuers.
- A publication on DISC can be reviewed here: <https://www.bc5.eu/Blockchain-Paradox-DISC-Hypothesis.pdf>

Impact on FR industry



- Though XENO was initially positioned as a women's safety device, its unique feature makes it a technology that has potential to disrupt not only the FR industry but enable a broad cross-sector applications.
- XENO is an innovative solution that for the first time deploys omnipresent gig workers (ride hailers, food deliverers, etc.) as crowdsourced first responders (FRs).
- As the FR industry is redefining and broadening the concept of first response, XENO is taking it to another level, converging the rapidly growing gig or crowd work economy with FR industry.
- XENO's revolutionary new approach to first response and management of emergencies will bring significant advantage to our business in terms of competitive advantage over the competition.
- As a result of Fed4Fire+ support the concept is now pursued by at least three consortia comprising of 30+ EU research entities / centres of excellence for building a novel First Response ([MOONSHOT](#)) framework, a patient monitoring remote clinical trial ([CLINTOS](#)) & Save My Soul (SMS), a novel wearable device solution for Emergency Medical Services (EMS).



Technological Impact



- The successful designing & deployment of DISC protocol not only marked a significant milestone for XENO ecosystem but also for the entire blockchain community resolving the long standing Blockchain paradox.
- The unexpected breakthrough in resolving the blockchain paradox has a much broader implication across the blockchain economy creating new business opportunities.
- Fed4Fire+ experiments not only impacted our XENO product development, but also our business potential and visibility within the blockchain space on account of the discovery of the DISC solution to blockchain's major adaptability problem.



Business Impact



XENO project directly benefited from the Fed4Fire+ experiments in terms of the XENO product itself reaching technical maturity of TRL 6-7.

1. The BLE5 mesh networking protocol is an important technological asset that the company can deploy in future IoT projects.
2. The wearable device can be improvised in future by addition of more sensors to enhance its functional utility.
3. The DISC protocol discovered in this project can be profitably deployed in crypto and DeFi market.

Company has already started harvesting some of the value even before this project reaches a closure.

1. The BLE5 mesh networking is being already deployed in one of our other projects.
2. Company has already commenced the development of 2 other wearable devices based on the outcome of XENO project.
3. We already have got a DISC development contract from a DeFi client.



Overall Impact



- With the current experiment, company has successfully tested the XENO device working and its backend blockchain infrastructure that ensures privacy for both the user and the rescuer.
- It also tested the novel P2P smart contract infrastructure to transfer variable rewards to the rescuer for every successful rescue action.
- Successfully achieving the goals that were set out in this experiment, delivered the expected ROI in terms of gained knowledge, real world implementability of XENO, reliability, TRL increase, product maturity & extended target markets.

Feedback



- Fed4Fire+ affiliate facilities are state-of-the-art and a boon for SMEs that mostly don't have such infrastructure in-house to test and validate their research.
- The Fed4fire resources available are really advanced and can be accessed 24*7.
- XENO involved many aspects that needed to be tested before its market adaptation.
- Blockchain backend infrastructure, P2P reward transfer & BLE meshnetworking, being the core functionalities of the XENO device, needed to be tested on a regular basis before concluding on a final protocol.
- Fed4fire, offering these testing tools free of cost and in a remotest possible way has turned out really beneficial for the project XENO.

Feedback: Used Resources & Tools



- We conducted the XENO experiment with BLE nodes of w-ilab1 using JFed tool.
- JFed provides really easy to use interface even for the first timers and also the resources are categorically distributed over the tool which makes it easy for the beginners.
- w-iLab.t testbed is composed of two separate deployments a few 100meters apart, of which one deployment i.e. wilab1 is equipped with distinct nodes incorporating BLE & WiFi modules.
- We conducted the experiment on the BLE nodes of w-ilab1 and hence needed to install the BLE scripts over the nodes to form a private BLE mesh network.
- The nodes were flexible enough to be programmed as per our BLE meshnetworking script.
- The best part of conducting experiment with Fed4fire resources is that the testing facilities can be customised easily as per the need of the experiment.

Feedback: Added Value to F4F+



- Fed4Fire+ offered an excellent opportunity and resources for experimenting our cutting edge solutions.
- The experience thus far has enabled us to take our project to the next level by validating our assumptions and further building upon our solutions.
- It is also a platform that provides continuous opportunity for the innovative technologies to be presented at a global level and offers wider visibility on the EU platform.
- The best thing about conducting experiment with fed4fire+ is that it provides wider access to the testbed resources and a single point testing solution for validating the technologies.
- Availability of budget, easy procedures and access to resources and availability of tools, all made the choice easy for us.

Feedback



Following components really make Fed4fire a preferred choice for experiments like XENO;

1. Diversity of available resources
2. Single point technical assistance
3. Easy setup of the experiments
4. Continuous support from the FED4FIRE+ on both technical as well as administrative front
5. Budget for conducting the experiment
6. Support and documentation details

Thanks to the experiment we conducted with Fed4fire+, we could come up with the revolutionary concept like DISC.

We are very certain that we would again associate with Fed4Fire+ with the upcoming open calls.





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WWW.FED4FIRE.EU