Final Year Project Showcase Batch-2019
Year 2023

	Department: **Telecommunications Engineering**	
	Programme: Telecommunications Engineering	
1	**Project Idea**	To employ blockchain technology in order to perform mobile roaming procedures such as billing and authentication for users subscribed to a Home Public Mobile Network (HPMN) and are requesting cellular services from the Visited Public Mobile Network (VPMN)
2	**Process**	1. Configure Network Gateways for both VPMN and HPMN so that they are capable of communicating with middleware APIs. For the implementation, Asterisk was used as an open-source Network Gateway server. It was configured with dial plans, and 2. Create and deploy a Node.js server that will act as a middleware between the network gateways and the smart contract APIs, using web3 injections. 3. Create and deploy a smart contract constructed using Solidity, to the Ethereum Network. This will hold the logic behind the procedures of billing and authentication of users.
3	**Outcome**	A smart contract deployed over the Ethereum network is capable of securely, and transparently handling billing and authentication processes over the roaming architecture as the overarching bridge between the HPMN and VPMN.
4	**Evidence (Theoretical Basis)**	Roaming fraud is the exploitation of roaming services from the VPMN by methods such as SIM cloning and theft. This leads to not only monetary losses for the HPMN, but also be a gateway to serious crimes such as smuggling and trafficking. The FYDP report showcases the development process of a smart contract through which the roaming services of billing and authentication are performed - which involves the blocking of users, and transfer, storage and verification of Call Data Records (CDRs).
5	**Competitive Advantage or Unique Selling Proposition**	The use of blockchain provides the advantages of immutability - which prevents fraudsters from manipulating information to obtain access to roaming services - and transparency - which means that all billing procedures are based on a decentralized system that creates an environment of trust between the HPMN and VPMN. The most important advantage is the fact that the blockchain service is much faster compared to the existing CDR transfer and billing procedures, henceforth preventing and reducing time delay vulnerabilities in the architecture.
a	**Attainment of any SDG** (e.g. How it is achieved	**SDG#08: Decent Work and Economic Growth:** Block chain services provide a stable source of economic growth and

	and why it is necessary for the region)	generate opportunities for the IT industry by creating positions in networking and software jobs. **SDG#09: Industry, Innovation and Infrastructure:** Current roaming architectures have vulnerabilities such as interoperability faults, and time delays which give opportunity to fraudulent exploits. The use of blockchain would be an innovative approach to security and immutability of data and services in such an architecture. **SDG#17: Partnerships to Achieve Goals:** It is difficult for starting mobile operators to join hands and partner with international mobile operators especially those in Pakistan because of the misplaced trust and skepticism by those operators abroad. This project can break such an obstacle as it provides transparency and reliability through its decentralized nature.
c	**Cost Reduction of Existing Product**	Roaming call prices are reduced, and CDR transfer fees, and overheads can be bypassed.
d	**Process Improvement which Leads to Superior Product or Cost Reduction, Efficiency Improvement of the Whole Process** (e.g. What is the issue is current process and what improvement you suggests)	Current roaming architecture involves the use of Data Clearing Houses (DCH) to transfer CDRs in the form of Transfer Account Procedure (TAP) files. This adds to overheads, fees and even taxes being implemented over a simple billing procedure which causes higher charge rates to consumers and the HPMN. The services provided through this project helps bypass the DCH altogether and will only require a low fee for transactions through the blockchain.
e	**Expanding of Market share** (e.g. how it expand and what is the problem with the current market)	The Telecommunication industry can benefit heavily through this project as it would increase global reach of services and help startup mobile operators from building trust with well-established mobile operators. The current industry suffers from a centralized approach which impacts negotiations between mobile operators when creating roaming pacts. This may be disadvantageous for one party in the pact and can affect users to also avoid their services in cases of very high roaming charges.
f	**Capture New Market** (e.g. Niche market or unaddressed segment)	The project will be a very attractive prospect for the blockchain market as it allows for the introduction and development of the blockchain decentralized network with the mobile telecommunications network industry.
6	**Target Market** (Industries, Groups, Individuals, Families, Students, etc) Please provide	1. Telecommunication Industry: Mainly plays its roles with mobile operators that provide roaming services to their users.

	some detail about the end-user of the product, process, or service	2. Mobile users: Can be of any generation ranging from GSM to 5G technology. The project provides backward compatibility as long as data structures, user identification and authentication criteria remain consistent. 3. Blockchain Services: web3 providers such as MetaMask can generate multiple services for telecommunication services such as subscription to an exclusive crypto wallet.
7	**Team Members** (Names along with email address)	Fiza Sahar | fizas7126@gmail.com Muhammad Erbaz Kamran | erbazkamran@gmail.com Syed Muhammad Jon | muhammadjoncs16@gmail.com Aiman Yaqoob | aiman2001yaqoob@gmail.com
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10	**Pictures (If any)**	**Pictures**