BLOCKCHAIN
SHOULD YOU BELIEVE ALL THE HYPE?

Blockchain, blockchain, blockchain, that is all you hear about these days, in between a few mentions of AI, Machine learning and IoT. But is it all just hype or are there concrete benefits that would make the efforts necessary to implement such a technology worthwhile?

In our previous article, entitled 'Blockchain – Empowering wholesale efficiency' we outlined several possible wholesale use cases which we categorized in four main business areas:

Voice, SMS and roaming

- Event recording and rating
- Invoicing and settlement
- Routing
- Number portability

Data and Networks

- Automated provisioning
- SLAs
- Security and Fraud
- Cloud

Payments

- Telecom payments
- Settlements
- Smart contracts

New services

- Remittance
- Blockchain as a Service
- Blockchain supported IoT

To prove that blockchain is not actually a hype, we will now dig deeper into three of these opportunities, which we think are low hanging fruit, to highlight how (and how quickly) blockchain technologies could and will disrupt our industry.

HYPE OR REALITY BLOCKCHAIN ENABLED VOICE AND MESSAGING SERVICES

The use of blockchain to potentially improve wholesale voice and messaging efficiencies, and therefore optimize margins and quality, is one of the most obvious use cases. Carriers are yet to standardize any of the processes and information they exchange, from pricing, to invoicing and multiple instances for human error, fraud or time delays exists through the end-to-end voice wholesale process. But let's see if and how blockchain could go beyond the hype and actually realize a number of wholesale voice efficiencies.

In essence, the functions involved in a voice wholesale chain can be boiled down to three basic steps.

1. To start, a price needs to be agreed for a particular termination (as defined by the country or region/operator dialing codes) in an agreed currency, and for an agreed period of time.
2. Then, when the service is delivered, call by call, the duration of that call and the destination need to be agreed so that the cost for that specific call can be calculated.
3. Finally, settlement can take place on the basis of the summation of those agreed charges at a frequency that the parties agree.

Although the process sounds simple, the implementation is often far from the case. Each party in a link has a record of the call from their own equipment, but due to signaling latency on intercontinental links, the details of the call may be subtly different between the two.

Fraud also exists where unscrupulous parties artificially extend the duration of a call to enhance their margin for example. Additionally, the calls are not actually matched call by call, but instead the overall invoice, which contains thousands or millions of calls to different destinations, is validated.

Differences always exist, and to some extent, the validation can only occur to within an acceptable range of accuracy. Anything outside the acceptable bounds must be investigated, if necessary, all the way back to the individual

call level. Even there, how do you know those basic call records haven't been manipulated to perhaps add a second or two to each call? Such tiny changes can have a big impact on the profitability of a small carrier.

Now, let's consider the approach using a carrier blockchain. As we know, a blockchain record starts with an agreed event and then records that event in a way that it is impossible to later change.

So, if the pair of carriers agree to reconcile their records for each call (the Call Detail Records or CDRs) in real time, either directly on a bilateral basis or via a trusted third party, then an authoritative record of that call could be written into a blockchain as a permanent record of a payable event between them.

For customer and commercial privacy reasons, this blockchain is not public, but the actual dialed digits could be encrypted after matching to avoid any remaining privacy issues.

The blockchain can also hold the agreed rate for that specific call at the time the call was made, and hence the price of the call can be calculated at the same time.

With this in place, we have a real-time agreed and immutable record of the financial transaction between those parties and the transfer of payment could occur immediately into a digital wallet belonging to the receiving party.

Bad debt issues would then become easier to avoid, as the call flow can be halted if insufficient funds are in the wallet. Invoices would then become more of a summary of those previously agreed transactions and hence problems in reconciling invoices would be considerably reduced.

The basic set of issues surrounding wholesale voice that could be addressed by blockchain are summarized below:

Issues	Current situation	Blockchain solution
Rating inefficiencies	Wholesale price lists are often exchanged in excel spreadsheets with variable formats for destinations and validity dates	Prices for each defined destination with its validity could be written securely into the blockchain with read access for the sending partner
Call measurement discrepancies	Each party involved in the chain setting up a telephone call has their own record of the details of that call	Specific elements of the call records from both parties are confirmed and the resultant agreed details could be written into the blockchain
Invoicing discrepancies and settlement delays	Wholesale invoices, which is based on bulk call pricing, are rarely exchanged more frequently than weekly, which makes validation difficult and bad debt a major issue	Each agreed call is rated in the blockchain and the transfer of digital funds between the sender and supplier immediately executed simplifying validation and reducing bad debt issues
Fraud risks	Frauds involving extending the duration of the call are rarely identified as they can be lost in the overall invoice	The matching of each call record could identify discrepancies, which an AI based system can validate by flagging fraudulent calls

HYPE OR REALITY
BLOCKCHAIN ROAMING SERVICES

Roaming continues to play a major role in telecoms and although there are many regulatory attempts to make it invisible to the end user, the underlying carriers still need to settle with each other for the value they add.

With 3G roaming, settlement is very dependent on the records maintained by the roaming network provider. In this case, messaging and data roaming sessions records are shared as files at varying intervals, both to enable settlement and also end-user billing. This brings in the risk of fraud and disputes from all parties involved in the roaming session, as well as delays in payment.

With 4G/LTE roaming, this differs in the way that the home network can itself see details of calling patterns and data sessions via signaling messages, although the basic settlement methodology remains the same. As a result, roaming fraud - such as making calls to an expensive international destination, while roaming with no intention to actually pay for the call - is still significant even though more rapid transfer of these CDR records can reduce the damage.

A carrier blockchain environment where each roaming operator would write the details of each roaming call or data session in real-time into the blockchain, such that the other interested parties can read and update their own records, could both increase the efficiency of the process and make a big dent in typical roaming frauds. In fact, it is likely that only one false call could trigger the removal of roaming privileges and a cutting-off of the fraud before it develops.

With the records written into the blockchain (and validated by the other parties using the signaling available in LTE), very similar efficiencies could be gained using the approach detailed in the voice and messaging use case above. In fact, this could be a potentially simpler implementation because pricing is often clearer and less subject to change, and volumes of transactions are lower, reducing any issues of scalability.

Issues	Current situation	Blockchain solution
Roaming sessions rating inefficiencies	Roaming price agreements are often exchanged in files and need to be managed for all partners	Prices for each defined roaming event, with its validity, could be written securely into the blockchain by each roaming partner
Roaming call recording inaccuracies and delays	The visited network party creates the call record, with the home network being unaware until the files are exchanged	The call records could be written into the blockchain by the visited network and be validated in real-time using signaling seen by the home network operator
Invoicing and call record file delays	Roaming files are exchanged infrequently, which leaves this process open to potential fraud	Each agreed call could be rated in the blockchain giving the home network immediate visibility of potential fraudulent activity

HYPE OR REALITY
BLOCKCHAIN ENABLED CONNECTIVITY SERVICES

Connectivity services - whether based on traditional private circuit approaches or more flexible software defined wide area networks - rely on partnerships between carriers. Often the customer will be contracting with a domestic service provider, but requiring international capabilities.

So a chain of domestic and international players is created to meet the full needs of that customer and provisioning of these services on an international basis requires the assignment of assets from various carriers to make an end-to-end service work as ordered.

At present, those services are put together using a combination of partnerships, agreement, some automated interfaces and manual "glue"! Changing the service requires changing the assignment of assets by the various parties involved and hence service on-demand can be complex to provide.

The world is undoubtedly moving quickly towards a model where the capacity can be assigned, turned up and then down as demands change - almost moving towards real-time provisioning and billing. The yearly contracts that underpinned much of the transmission world will soon be a thing of the past and so the entire provisioning and billing system needs to be able to handle rapidly changing demands.

The carrier blockchain could be a major contributor to improving the efficiency of this process, acting as the official record of usage between carriers, linking the provisioning and billing between carriers of higher level transmission capabilities and driving the invoicing of changes of end user services across those networks.

Again, work is needed between the carriers to make this a reality - particularly in the development of APIs between their service management and provisioning systems, to enable automated provisioning of service by an external partner to take place.

Issues	Current situation	Blockchain solution
Provisioning	Manual orders are exchanged and often manual provisioning utilized	Asset availability and the orders for new assets could be written into the blockchain, driving automated provisioning
Settlement	Invoices are created for all orders from that customer and mailed monthly with the potential for errors and bad debt	Automated asset usage details are now available in the blockchain and the settlement could be implemented daily if required
SLA monitoring	Manual monitoring of SLAs separately by each party involved in the provisioning of the circuit	Automated recording of service outages and degradations could be written into the blockchain and be accessible by all parties involved in the provisioning of the circuit
SLA compensations	Lengthy compensation and dispute process, done manually	Automated check of the SLA agreement and real-time payment of compensation

With the results of those activations written into the carrier blockchain, each party can be satisfied that settlement of the agreed charges will happen without any further manual involvement.

Linked to this could be the automation of service performance measures that, themselves, often have a financial implication. Automated recording of service outages and degradations into the blockchain, coupled with the inclusion of the service level agreement (SLA) itself, would provide a system that compensates both the carriers and the end user for any service problems that were outside the agreement.

The wholesale blockchain end-to-end process is described in the diagram on the following page. This process would be similar for most wholesale use cases, whether it be voice, messaging, roaming or connectivity services.

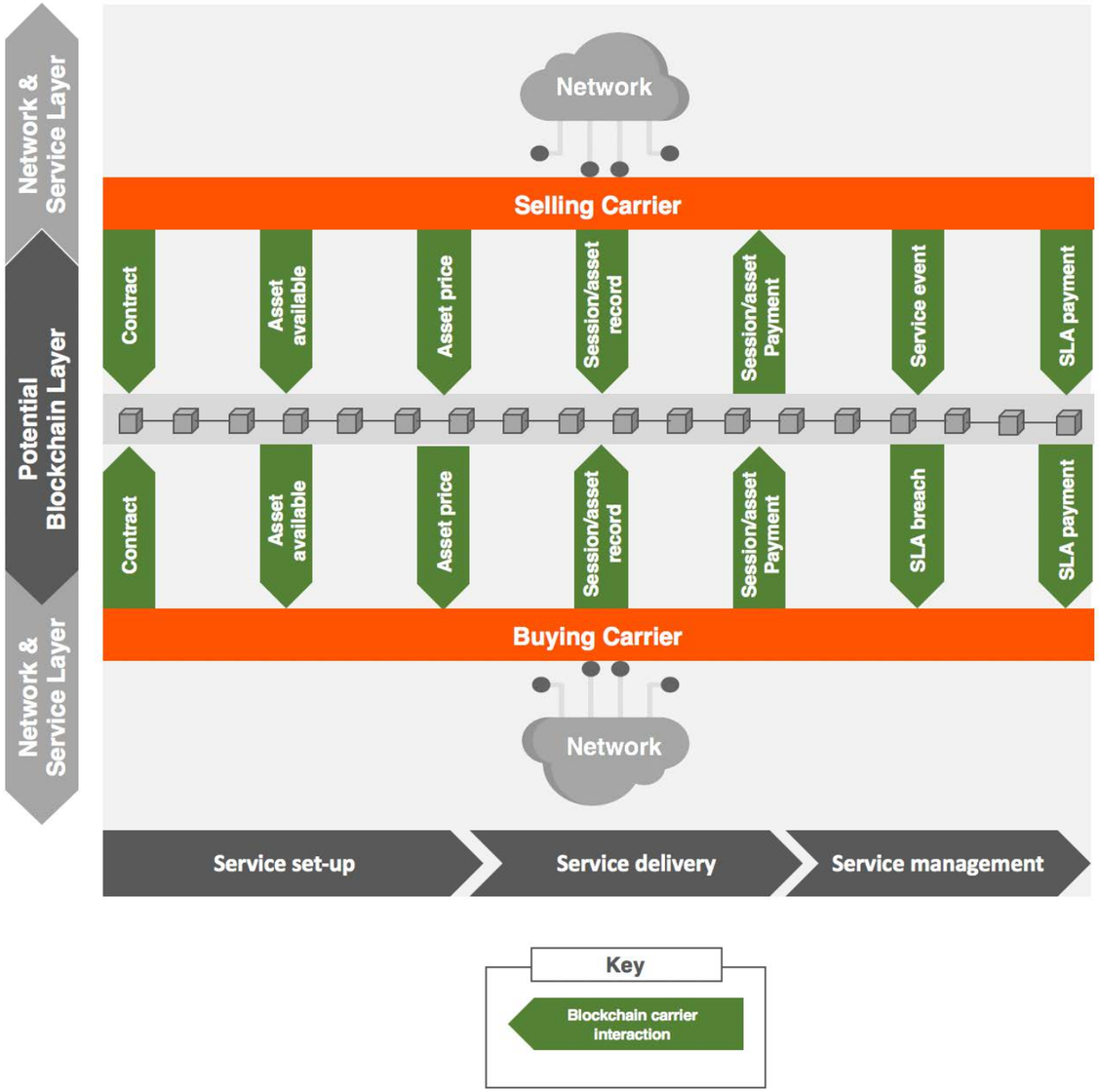
HOW TO TURN CARRIER BLOCKCHAIN INTO A REALITY?

So, in theory, wholesale blockchain use cases seem to be worth further investigation. But what needs to take place to turn this into reality? From our point of view a few questions need to be considered:

- Processes and data exchanged need to be standardized before a wholesale blockchain can be implemented successfully. Who will take on this responsibility?
- Is the creation of a telecom crypto-currency necessary?
- Should a private or public blockchain ecosystem be established?
- Is a wholesale blockchain federation the way to go?

All of these questions will need to be answered by the industry if it wants to succeed with the implementation of real blockchain solutions that help the wholesale community to be more efficient and facilitate the adoption of new digital services.

HOW THE WHOLESALE BLOCKCHAIN PROCESS COULD LOOK IN THE FUTURE



ABOUT THE AUTHOR

Steve Heap
CTO
HOT TELECOM

Steve has a lifetime of experience in designing, engineering and operating networks, both domestic and international. With leadership experience in small technology start-ups through to global service providers, he has deep experience in a wide range of products, technologies and geographies.

He has the rare skill of being able to explain complex technical issues in easily understood concepts and uses that extensively in his consulting work with HOT TELECOM.

ABOUT TELEFONICA INTERNATIONAL WHOLESALE SERVICES

Telefonica International Wholesale Services (TIWS) provides world-class international wholesale services to fixed and mobile operators, service providers and wholesale carriers and new types of clients like OTT-Media companies.

Our global portfolio includes Voice, Carrier Enterprise, Mobile and Satellite services, innovative Digital solutions (Security, Cloud, IoT, Big Data) and end-to-end solutions for enterprises.

As a leading global provider of a wide range of integrated communication solutions, Telefónica has a global footprint, with presence in over 40 countries (particularly strong in Latin America & Europe) and service reach in more than 170 countries.

To learn more, please visit https://www.wholesale.telefonica.com