

# Wholesale Voice Settlement

## Section 1 Summary

Use Case summary			
<b>Use Case ID:</b>	ICT-003	<b>Use Case Type:</b>	Vertical
<b>Use Case Title:</b>	<b>Wholesale Voice Settlement</b>	<b>Domain:</b>	IT & Telco; Finance
<b>Stakeholder:</b>	Wholesale voice carriers		
<b>Value Transfer:</b>	Money transfer	<b>N. of participants:</b>	<b>1000+</b>
<b>Data:</b>	Carrier identities, commercial relationships, their terms, and settlement results are stored in DLT, some encrypted or hashed. CDRs (Call Detail Records/Call logs), settlement process are stored outside DLT but can be referenced by DLT		
<b>Users:</b>	Wholesale carriers		
<b>Identification:</b>	Carriers are identified, however the peers of a specific bilateral relationship are not necessarily specifically known, only their membership in the global carrier group is known. Some information about the voice call supply chain may be shared.		
<b>Predicted Outcomes:</b>	Implementation of global DLT system will automate existing manual processes and consolidate (currently disperse) systems, thus streamlining, increasing efficiency and reducing costs. It will also reduce human errors and time spent resolving disputes, further improving efficiency. Through transparency and short turnaround - fraud may be reduced and dissolved.		

Overview of the Business Problem or Opportunity
Though the underlying systems involved in bilateral wholesale voice trade are mostly automated, some of the handoff of information from one system to another is not yet fully automated, and the settlement and dispute resolution are handled mostly through a labour intensive manual process. Through DLT technology, certain elements of this process may be streamlined and automated.
Why Distributed Ledger Technology?
<p>The commercial interactions between carriers are carried out in an environment of mutual suspicion. Settlement between disparate systems operated by mutually-suspecting commercial entities requires either a trusted, neutral (but paid for), third party, or a lengthy laborious bilateral manual process to resolve commercial disputes and reach settlement.</p> <p>Certain bilateral processes, primarily in the mobile communications sector, use a centralized party to resolve disputes and reach settlement. However – the charges levied by such centralized parties amount to a significant (and growing) part of the ever thinning margins of the wholesale mobile business. The margins in the wholesale voice business are even thinner than those in the wholesale mobile business, rendering a paid-for centralized entity a non-viable solution.</p> <p>In addition to that – the current wholesale voice business process involves multiple disparate functions, each performed by a disparate system, that still require sequential treatment of data and feeding the output of one system to the next system in the sequence (e.g. CDR collection on voice</p>

switch fed to rating engine that feeds the invoicing systems that leads to manual dispute-resolution that eventually leads to settlement).

A DLT solution may be used for multiple purposes:

1. Create a common interchange and enforcement mechanism without a trusted third party.
2. Integration of the functionality of multiple disparate systems into a single system that performs a streamlined process that rates the CDRs, compares with the bilateral carrier, identifies and resolves disputes, then settles the account.
3. Settlement can be handled through automated FIAT currency transactions by APIs to Banks' swift clearing systems, through automated DLT transactions of electronic versions of FIAT currencies, or through crypto-currency transactions using either an existing crypto-currency or one that will be created for the purpose of wholesale telecommunications settlements.

## **Section 2 Current process**

### **Current Solutions**

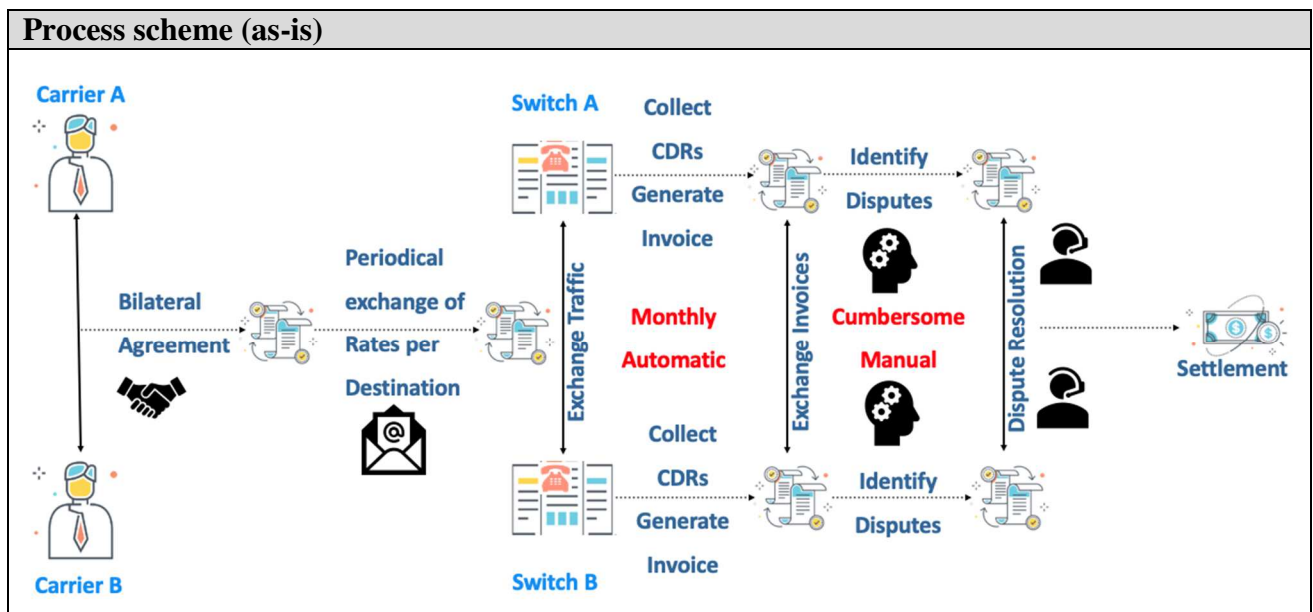
Carriers have rating systems which perform automated analysis of CDRs, and automatically generate invoices. Such invoices are only seldom accepted by the recipient carrier and are often disputed. Disputed invoices then undergo a manual dispute resolution process during which both carriers negotiate, try to identify the reasons for the disputes and then reach settlement. It is not uncommon to see such negotiations stretch over months and at times both parties end up in court.

It is estimated that the wholesale voice industry as a whole is spending an order of magnitude of the equivalent of 10 years of HR every month resolving disputes.

### **Existing Flow (as-is)**

<b>Step</b>	<b>User Actions</b>	<b>System Actions</b>
1.	Telephone call is made	CDR is collected and stored (Automatic)
2.	(periodical, typically monthly)	<p>All collected CDRs are rated based on comparison of the destination of the call with the agreed upon rate to that destination, and multiplication of the rate by the duration of the call, taking into account agreed upon rounding of duration (typically on a 1 second or 5 second basis). (Automatic)</p> <p>CDRs are being separated to inbound (for which the carrier is expecting to be paid by the bilateral carrier) and outbound (which the carrier expects to be invoiced for by the bilateral carrier). (Automatic)</p>

Existing Flow (as-is)		
Step	User Actions	System Actions
3.	(periodical, typically monthly)	<p>All rated inbound CDRs are collected and summed up. An invoice is generated for the sum of all rated CDRs and sent to the bilateral carrier. (Automatic)</p> <p>All rated outbound CDRs are collected and summed up but no invoice is generated. The sum of those rated CDRs is the amount the carrier is expecting to be invoiced for by the bilateral carrier. (Automatic)</p>
4.	(periodical, typically monthly)	Invoices are exchanged between the bilateral carriers. (Automatic or semi-auto).
5.	An invoice from a bilateral carrier is received.	Compare the invoice received with the amount the carrier is expecting to be invoiced for (as calculated in step 3 above) and identify differences, if any exist. (Manual)
6.	If disputes are found	Negotiate with bilateral carrier. Try to identify the reason for the dispute. Agree which carrier made the error that caused the dispute. Re-calculate the invoice amount after correcting the error and repeat step 5 above. (Manual)
7.	Disputes have been resolved or no disputes	Settle the outstanding undisputed invoices. (Manual)



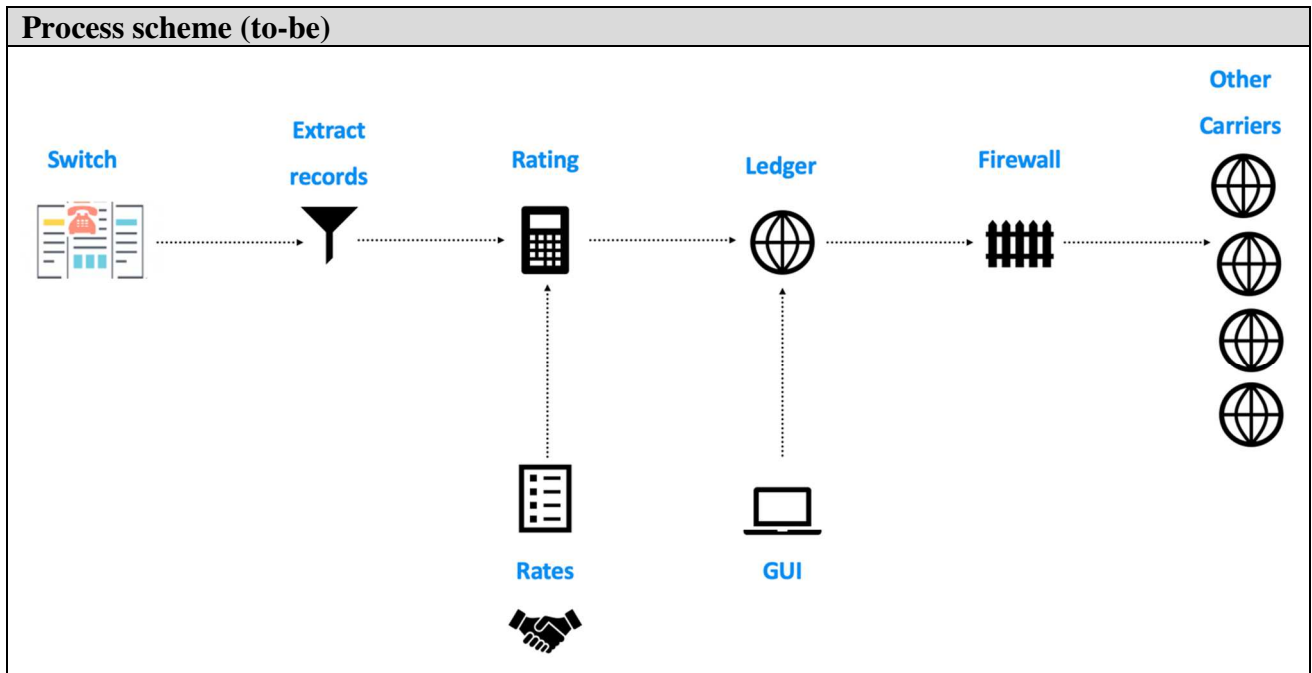
Data and information (as-is)		
Data	Type	Description
1	<i>Documents</i>	<p>MSA (Master Service Agreement) or T+C (Terms and Conditions). Defines the rules of engagement, credit and payment terms, dispute resolution methods, rating methods, governing law.</p> <p>CDR – Call Detail Record. Includes information of the originating telephone number, the destination telephone number, the identity of the carrier sending the call, the identity of the carrier receiving the call, call start time, call end time (or call duration), result of call (success, fail, RNA [Ring No Answer]).</p> <p>Rate-Sheet. Periodically exchanged between bilateral carriers and defining the rate-per-minute of voice traffic sent to certain destinations.</p> <p>Rated-CDR. Excludes information of source and destination telephone numbers. Includes the commercial value of the call through multiplication of the call duration by the agreed upon rate appearing in the current bilateral rate sheet.</p>
2	<i>Payment transactions</i>	<p>Invoice. The sum of all rated CDRs for a period.</p> <p>Settlement. Payment of undisputed Invoices.</p>

Participants and their roles (as-is)		
Actor	Type/Role	Description
1	<i>Originating Carrier</i>	The carrier sending voice traffic to another carrier.
2	<i>Recipient Carrier</i>	The carrier receiving voice traffic from another carrier.

Other Notes
<p>In a bilateral relationship a carrier can be both an Originating Carrier and a Recipient Carrier.</p> <p>A Carrier can have relationships with multiple carriers.</p> <p>Tripartite relations may exist where two carriers agree to exchange traffic through a third, transit, carrier. In such case there may be separate agreements between the three carriers (Originating, Transit, Recipient).</p>

### **Section 3 Expected process**

<b>Expected Flow (to-be)</b>		
<b>Step</b>	<b>User Actions</b>	<b>System Actions</b>
1.	Telephone call is made	CDRs are collected and stored (Automatic)
2.	(periodical, PoC has proven that the period can be as short as 15 seconds)	<p>All collected CDRs are rated based on comparison of the destination of the call with the agreed upon rate to that destination, and multiplication of the rate by the duration of the call, taking into account agreed upon rounding of duration (typically on a 1 second or 5 second basis). (Automatic)</p> <p>CDRs are being separated to inbound (for which the carrier is expecting to be paid by the bilateral carrier) and outbound (which the carrier expects to be invoiced for by the bilateral carrier). (Automatic)</p>
3.	(periodical, same frequency as above)	<p>All rated inbound CDRs are collected and summed up. An invoice is generated for the sum of all rated CDRs and sent to the bilateral carrier using a bilateral DLT. (Automatic)</p> <p>All rated outbound CDRs are collected and summed up but no invoice is generated. The sum of those rated CDRs is the amount the carrier is expecting to be invoiced for by the bilateral carrier. (Automatic)</p>
4.	An invoice from a bilateral carrier is received through DLT.	Compare the invoice received with the amount the carrier is expecting to be invoiced for (as calculated in step 3 above) and identify differences, if any exist. (Automatic)
5.	If disputes are found	Apply a dispute-resolution algorithm (described separately). (Automatic with certain exceptions)
6.	Disputes have been resolved or no disputes	Settle the outstanding undisputed invoices using DLT. (Automatic or Manual)



Participants and their roles		
Actor	Type/Role	Description
1	<i>Originating Carrier</i>	The carrier sending voice traffic to another carrier.
2	<i>Recipient Carrier</i>	The carrier receiving voice traffic from another carrier.
3	<i>Bank</i>	In certain scenarios DLT settlement may initiate an API call to a Bank's SWIFT service to perform FIAT currency payment.
4	<i>IMF (International Monetary Fund)</i>	In certain scenarios DLT settlement may take place using an electronic version of SDR (a currency defined by IMF).

Data and information		
Data	Type	Description
1	<i>Documents</i>	<p>MSA (Master Service Agreement) or T+C (Terms and Conditions). Defines the rules of engagement, credit and payment terms, dispute resolution methods, rating methods, governing law.</p> <p>CDR – Call Detail Record. Includes information of the originating telephone number, the destination telephone number, the identity of the carrier sending the call, the identity of the carrier receiving the call, call start time, call end time (or call duration), result of call (success, fail, RNA [Ring No Answer]).</p> <p>Rate-Sheet. Periodically exchanged between bilateral carriers and defining the rate-per-minute of voice traffic sent to certain destinations.</p> <p>Rated-CDR. Excludes information of source and destination telephone numbers. Includes the commercial value of the call through multiplication of the call duration by the agreed upon rate appearing in the current bilateral rate sheet.</p>
2	<i>Payment transactions</i>	<p>Invoice. The sum of all rated CDRs for a period exchanged thru DLT.</p> <p>Settlement. Payment of undisputed Invoices performed through DLT.</p>

Security and privacy
<p>1. The use case assumes a <i>Permissioned Private DLT</i> that uses <i>PoA (Proof of Authority)</i> with multiple signatures and <i>DBFT consensus mechanism</i>.</p> <p>2. Access to the platform is only allowed to Carriers identified as such by other carriers and is administered by a <i>SPV (Special Purpose Vehicle)</i> that includes Carriers members of the DLT.</p>

Main Success Scenario
<p><b>Interoperable private blockchains</b></p> <ul style="list-style-type: none"> <li>Between bilateral Carriers, using interoperable protocol.</li> <li>Bilateral transactions are carried out on a bilateral DLT (one per pair).</li> </ul> <p><b>Open-source shared blockchain</b></p> <ul style="list-style-type: none"> <li>Failover to Shared blockchain.</li> <li>Permissioned network using open-source Ethereum nodes.</li> <li>Also used for dispute resolution using ZKP for Transit traffic.</li> </ul> <p><b>Pluggable Commercial Logic and Ingestion</b></p> <ul style="list-style-type: none"> <li>Single shared network with variety of products and interactions</li> <li>Dispute resolution may use AI/Heuristics algorithms and can include failover to manual resolution based on criteria.</li> </ul>

- *Dispute resolution algorithms may differ on a partner-Carrier and destination basis.*

#### **Conditions (pre- or post-)**

1. *Participating Carrier must be accepted to the DLT platform based on criteria set forth by SPV.*
2. *Participating Carrier must provide a Dedicated or Virtual compute resource that meets the requirements set forth by SPV, either on-premise or in Cloud, and load the software provided by SPV on the compute resource.*

#### **Performance needs**

*Based on estimated volume of traffic and number of bilateral connections the compute resources can be sized with accuracy. The PoC has proven that an off-the-shelf standard configuration VM in public clouds is sufficient for the task.*

#### **Legal considerations**

1. *The PoC is implemented using existing legal contracts between Carriers.*
2. *The use of crypto-currency is an option that may be subject to certain legal restrictions in specific geographies,*

#### **Risks**

*International Wholesale Voice trading (IDD) is a well-established business that has its roots in the days of national operators (PTTs), and although it has gone through deregulation in most countries, it is one of the most supervised and controlled environments in the telecom business. Automation of elements of this business, through use of DLT or without it, does not change the legal frameworks the IDD business is established upon.*

*The only exception to the above is the use of DLT to settle commercial transactions using Crypto-Currencies. Reason being that such transactions may be banned in some geographies due to local regulations. Said risk can be mitigated as Crypto-Currency is not a mandatory method for settlement, and as discussed above, settlement can also be executed through API based automated SWIFT bank transactions, through electronic versions of FIAT currencies or even manually as is done today.*

*Other risks may be related to acceptance of suspicious carriers to the DLT, who may try to perform fraudulent IDD transactions. This is an existing risk and the move to DLT-based automation will neither increase the risk itself, nor will it risk an increase in its occurrence. On the contrary – DLT-based automation will shorten the cycles by which fraudulent activity can be identified, thus reducing the exposure in case of such activities. Add to that the reputation management that is embedded into DLT which will allow carriers to easily verify the reputation of a potential bilateral partner prior to establishing a business relation.*

#### **Special Requirements**



*The PoC has demonstrated that no special requirements exist. Considering a full-scale system – the compute resources and data transport resources required for proper functionality of the system are within what is currently available off-the-shelf as public-cloud based VMs or commercially and publicly available blades and servers to be installed in a private cloud or a data centre. Connectivity wise – the PoC has demonstrated that a 1Gbps link should suffice to carry the entire global CDR exchange between carriers using DLT.*

External References and Miscellaneous

Other Notes

## Appendix 1

### Domains for use cases categorization

#### Vertical:

1. Finance
  - a. Financial management & accounting
  - b. International & interbank payments
  - c. Clearing and settlement
  - d. Reduction of Fraud
  - e. Financial messaging
  - f. Asset lifecycles and history
  - g. Trade finance
  - h. Regulatory compliance & audit
  - i. AML/KYC
  - j. Insurance
  - k. Peer-to-peer transactions
2. Healthcare
  - a. Pharma
  - b. Biotechnology
  - c. Medicine
3. Industries
  - a. Manufacturing
  - b. Energy
  - c. Chemical
  - d. Retail
  - e. Real estate
  - f. IT and telco
  - g. Supply chain management
  - h. Transportation and logistic
4. Government and public sector
  - a. Taxes
  - b. Government and non-profit transparency
  - c. Legislation, compliance & regulatory oversight
  - d. Voting
  - e. Taxation and customs
  - f. Intellectual property management

#### Horizontal:

1. Identity Management
  2. Security Management
    - a. Public Key Infrastructure
  3. Internet of Things
  4. Data storage (Inter-organizational data management)
-