

A photograph of a young woman with long dark hair, smiling and talking on a white smartphone. She is wearing a yellow top. The background is a blurred indoor setting, possibly a store or office.

## Solution Brief

# VoLTE: The Next Generation of Voice

## Introduction

Voice over LTE (VoLTE) is no longer just a buzz word in the telecom community but is quickly becoming reality, with implementations appearing around the world. VoLTE, or the ability to transmit voice services over an LTE network in the same way that data is transmitted, is already on a fast track to completely changing the telecommunications landscape. Most major operators across North America already offer VoLTE services to their subscribers, and many other operators around the world are following the trend. Perhaps the biggest indication of how great of an impact VoLTE is going to have on the future of telecommunications came with the shutdown of AT&T's 2G network at the beginning of 2017<sup>1</sup>, and Verizon's announcement that they will be shutting theirs down by the end of 2019<sup>2</sup>. We can only expect that other MNOs around the world will do the same. Greenfield LTE operators, in fact, aren't bothering with legacy voice networks whatsoever, leapfrogging into VoLTE.

As of Q4 2016, more than 80 mobile operators had launched VoLTE services. VoLTE service revenue will grow at a CAGR of 34% between 2016 and 2020, and by the end of 2020, VoLTE subscribers will account for more than \$200 Billion in revenue, driven not only by traditional voice services but video calling and other services as well<sup>3</sup>.

## The Benefits of VoLTE

Launching VoLTE has benefits for both operators and subscribers, making it one of the best investments a mobile operator can make.

### Subscriber Benefits

- Improves Call Quality - Subscribers will experience high-definition calls on VoLTE. Plus, LTE typically provides far better coverage, so subscribers will be able to make calls in more places.
- Increases Services - With VoLTE, services like video calling, file transferring, real-time language translation, video voicemail, and instant messaging are instantly possible from the phone's native dialer.
- Faster Connections - Subscribers will notice a substantial difference in how quickly their VoLTE calls connect compared to their legacy network voice calls.

- Improves Battery Life - With VoLTE calling available through the native phone dialer, subscribers will no longer need to use OTT apps (which drain batteries more quickly) to make VoLTE calls.
- VoWiFi Seamless Handover - While VoWiFi is on the rise, it's limited to locations with WiFi coverage. But, if their provider offers VoLTE, calls can be handed off to the LTE network when a subscriber leaves the hotspot, without their call getting dropped. Once VoLTE is fully deployed, it will be easier to offer VoWiFi in areas where the LTE spectrum is weak or unavailable.
- Device Interoperability - Is my phone compatible with CDMA or GSM? Who cares!? Gone are the days of worrying about whether or not your device will work on a network! With only one standard for VoLTE worldwide, eventually, all devices will work on all networks.

## Operator Benefits

- Cost-Effective and Simple - With VoLTE, operators have a path to retire their costly legacy voice networks. By eventually phasing out the use of these networks, operators will have fewer networks to manage, reducing costs and increasing efficiency.
- Frees Spectrum for Allocation Elsewhere - After phasing out legacy networks, the freed up traditional voice spectrum can be taken and put to better use, like more bandwidth for lucrative data services.
- Lowers OTT Risk - With the right VoLTE pricing, subscribers won't need Skype or other OTT applications to make calls over their data network. Plus, VoLTE provides a more consistent QoS compared to OTT apps, allowing operators to combat revenue loss to OTT providers.
- Targets New Markets - With the better call quality offered with VoLTE, operators can target the enterprise market (a traditionally higher-ARPU market), with specific applications developed just for them. The possibilities are endless, and many other new markets could also be served.
- Improves Customer Experience - VoLTE with high-definition calls has many benefits for subscribers as well, keeping an operator's current customers loyal and happy, while also winning them new customers.

## Alepo's VoLTE Solution

Enabling VoLTE is not as easy as using a VoIP connection. Carriers need to hand off voice calls, without interruption, between LTE networks and legacy voice networks. The biggest obstacle in the path to VoLTE is that LTE does not natively support the circuit-switched protocol. LTE is an IP-based network standard, so network providers must ensure that their network handles call compatibility. VoLTE uses the IP Multimedia Core Network Subsystem (IMS) architectural framework. With the IMS framework, VoLTE is able to inter-operate with circuit-switched voice networks without having any dependency on, or requirement for, them.

Alepo's VoLTE Solution is built around the need for the core control-plane network components like the HSS, PCRF, and OCS to connect to the IMS core network elements. Alepo's Home Subscriber Server (HSS), Policy and Charging Rules Function (PCRF), and Online Charging System (OCS) have been enabled to support VoLTE services with the Cx, Sh, Rx, and Ro interfaces to connect to the IMS application server (AS) and interrogating, proxy, and serving call session control functions, I-CSCF, P-CSCF, and S-CSCF, respectively.

## Solution Features and Benefits



### Dedicated Bearers

Alepo's VoLTE solution enables operators to set a dedicated bearer (QoS) for every session to ensure that subscribers are guaranteed high-quality VoLTE calls, preventing the frustrations caused by poor call quality.



### Global Roaming Support

Alepo's VoLTE solution enables global roaming support with guaranteed QoS to the subscriber. The solution can detect the roaming subscriber's location and apply location-specific policy rules and QoS.



### High-Reliability

Alepo's VoLTE solution is a highly fault-tolerant system due to the support of both local and geo-redundancy.



### Seamless Handover

Alepo's solution can fully integrate with the IMS core to facilitate seamless handover between VoWiFi and VoLTE networks.



### Alternative Voice Support

Alepo's solution supports both Circuit Switch Fall-back (CSFB) and Single Radio Voice Call Continuity (SRVCC).



### Scalable

Alepo's VoLTE solution is an industry-leading, software-based solution that provides endless scalability to grow with the operator.



### Industry Standard

A 3GPP-compliant solution, Alepo's VoLTE solution supports Rx, Ro, Cx, Sh, Gx, and S6a interfaces.



### Cross-Platform Integration

Alepo's VoLTE solution integrates across different IMS functions and provides support for all the major integration points to support VoLTE end-to-end calling.



### Interoperable

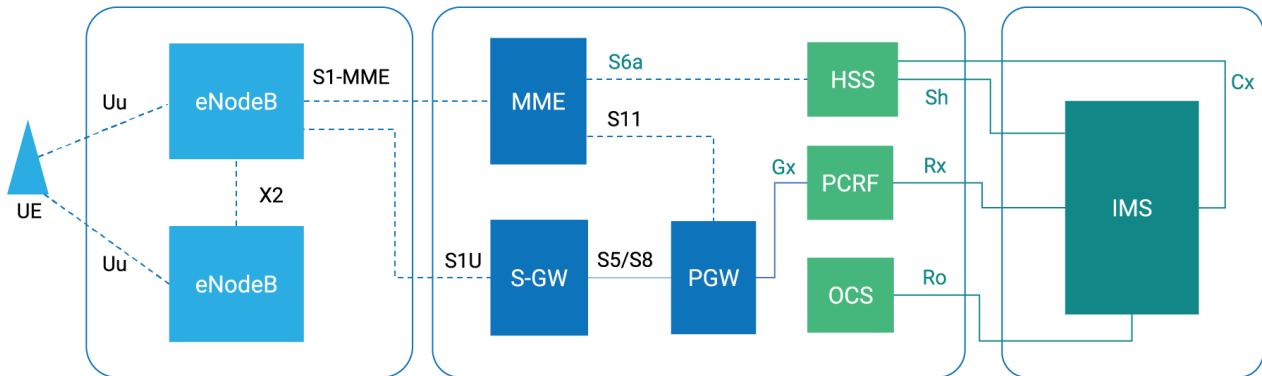
Alepo's VoLTE Solution is interoperable with any operator's existing systems. Utilizing existing elements leverages the prior investment while also enabling a quick roll out of high-quality VoLTE services.



### Vendor Neutrality

All Alepo interfaces are vendor neutral and comply with 3GPP standards. This means that operators don't need to worry about vendor lock-in or issues with interoperability.

## Technical Architecture



### Supported Interfaces

- Rx - Rx is an interface between the PCRF and the IMS to establish dedicated bearer support. The PCRF provides policy control decisions, which are enforced by the PGW, and flow-based charging control functionalities. Based on the data received over the Rx interface from the P-CSCF, and operator-defined policy rules, the PCRF forms the quality of service rules (such as maximum bandwidth and dedicated bearers) and charging rules, and sends them to the PCEF via Gx. This enables subscribers to make high-quality voice and video calls on LTE networks.
- Ro - Ro handles the online charging of data by using the OCS. For online charging, the charging function needs to perform credit control before allowing resource usage, which results in an event and session-based charging.
- Cx - The Cx interface enables IMS registration and passing of subscriber data to the S-CSCF between the I/S-CSCF and HSS.
- Sh - The Sh interface is between the VoLTE Application Server and HSS to enable service and subscriber-related information to be passed to the Application Server or stored in the HSS.
- Gx - The Gx interface sits between the PCRF and PGW and can be used for charging control, policy control or both by applying AVPs relevant to the application.
- S6a - S6a sits between the HSS and MME and supports the Authentication Information Retrieval Procedures.

## VoLTE Example Use Cases



### Guaranteed QoS- Dedicated Bearer Management

Premium subscribers and services need better priority handling in the network. QoS plays a key role in defining the priorities for certain customers or services, especially when the network is congested. VoLTE is an important service that can be given better priority than others to ensure that customers are able to make high-quality calls.



### Differential Metering for VoLTE and LTE Data services

Operators can charge differently for a customer's LTE use, whether it's VoLTE or data use. By charging less for VoLTE, customers aren't discouraged from making VoLTE calls in order to save their data.



### VoLTE Call with Audio & Video

One of the best things about VoLTE is the ability to provide video calling as well as audio. Now, people who live across the world or just across town from each other have the ability to speak to each other "face-to-face!"



### VoLTE Roaming

Customers have gotten smarter and know that it's cheaper for them to make VoLTE or VoWiFi calls while roaming than it is to make regular calls. So operators are losing a great deal of revenue in what was once a lucrative market. They can combat this challenge by charging differently for VoLTE calls made while roaming. This gives operators the ability to still gain from calls made while customers are roaming on other networks, to help offset the costs they incur to provide roaming to their customers.



### Call Forwarding

Operators can provide add-on services in VoLTE, just as they did with legacy networks. Add-on services can be included with a customer's subscription, or be available for an additional cost. Call forwarding is one example of these additional services.



### Audio & Video Conferencing

Operators can charge differently for a customer's VoLTE services, whether it's audio or video usage, providing flexibility and granularity of pricing for operators.



### Circuit Switch Fall-back & Single Radio Voice Call Continuity

Voice service continuity is not guaranteed when a VoLTE subscriber roams between the LTE coverage area and other wireless networks—and it is a significant challenge. To overcome this challenge, Alepo's solution supports both Circuit Switch Fall-back (CSFB) and Single Radio Voice Call Continuity (SRVCC). The CSFB solution requires terminals to be equipped with either dual-mode/single-standby or dual-mode/ dual-standby capabilities and enables dual-mode/single-standby mobile phones to simultaneously use dual-network services. SRVCC offers VoLTE service within the LTE coverage area, and circuit switch-based voice service outside the LTE coverage area, with a smooth transition as the customer, moves between the two.



### Emergency Call Handling

Operators can ensure that emergency calls receive the appropriate QoS, irrespective of a customer's balance or subscription.

## References

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