# Delivering Voice and Data on 4G Networks Through Cost-Effective Densification

## The Challenge

Moving to an all IP network brings the promise of improved customer experience and the ability for mobile operators to launch new services. However, the current LTE network architecture requires fallback features to include traditional 2G/3G voice services.

Converting today's circuit-switched networks to all IP networks with the same reliability for data and voice services that customers have come to expect comes with challenges. Modifying the existing network design to deliver the same quality of voice services that MNOs offer today requires at least a 25% RAN increase, impacting both capital and operational expenditures.

Mobile operators need to focus on increasing capacity and improving signal quality at the existing cell edges through cell splitting and network densification so that LTE coverage for voice (not only data) along highways, suburban areas, and rural areas remains consistent. Two challenges need to be addressed:

## Overview

As mobile operators deploy 4G and 5G networks, how people connect in rural and urban areas will drive solutions that operators need to deploy. Easy to install, low-cost and high-performing cloud-native Parallel Wireless OpenRAN supports macro or small cell deployments for densification and delivers superior end user QoS for consumers and industries.

## Challenge #1

To implement VoLTE as the technology for IP voice, the networks need to be densified to add additional capacity. This densification will require additional CAPEX investment and is hard to justify for MNOs providing coverage in both rural and urban areas.

## Challenge #2

Additionally, other QoS metrics, e.g. latency and jitter, need to be met for VoLTE to provide quality voice experience. If they are not met, this will result in unacceptable QoS for VoLTE and will prevent MNOs from switching voice services.

A cost-effective solution needs to be implemented in order to address these challenges: CAPEX investment for densification and voice quality.

## Implementing QoS

While densification and providing underlay co-channel cells in high data usage areas can reduce the overall data traffic in LTE networks and address the VoLTE services degradations, overall interference management can be a challenge. To a large extent, the advanced network orchestration methods have addressed the interference-related issues caused by densification. Utilizing the latest FeICIC and eCoMP in conjunction with centralized orchestration will reduce cell interferences. FeICIC and eCoMP, will improve overall end-user throughput across the densified coverage area.

Utilizing all these techniques can guarantee acceptable QoS for real-time service (e.g. VoLTE) across the network and will enable MNOs to finally migrate to VoLTE and retire their 3G voice networks. By retiring their 3G voice network, MNOs can re-farm these frequencies and utilize them in their LTE network to provide even higher bit rates and better services by allocating more resources to each individual end-user. A combination of all these techniques will enable a smooth migration to an all IP network without scarifying voice and data QoS across the coverage area. New approaches based on software-based architectures with integrated orchestration and optimization capabilities make these types of deployments a reality with reasonable CAPEX and OPEX.

## Tackling CAPEX and OPEX for VoLTE Densification

However, there are financial hurdles associated with densification in LTE networks as well. Increasing the number of cells in the same geographical area increases deployment CAPEX. At the same time, due to the smaller coverage footprint for densified deployment, the legacy ROI is not applicable. Each cell is going to support fewer users and this will have an impact on mobile operators' bottom line. Particularly in lower population density deployments, the legacy mobile solutions are not justifiable for densification from the cost perspective. A new approach for lowering CAPEX is necessary for densification in these morphologies. Technologies that are easy and fast to deploy and can be integrated seamlessly into existing deployments will save CAPEX while meeting densification for VoLTE objectives.

At the same time, the legacy approach has additional licensing fees for enabling VoLTE and other related features to enable voice services across LTE networks. This will affect lower and higher ARPU coverage areas. Although rural users have lower ARPU, mobile operators cannot scarify QoS or other services to reduce overall cost. This will require a new simplified approach for the overall cost and licensing structure to deliver cost savings in the long run.

## Summary

Quality voice can help operators keep their subscribers happy and maximize their spectrum investment. Parallel Wireless OpenRAN can support coverage, capacity and densification deployment scenarios at the lowest TCO and can be deployed on accelerated timeline.



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