



IMS software solutions that power next generation ip communications devices

## mCUE® Rich IP Communications Client on Android™

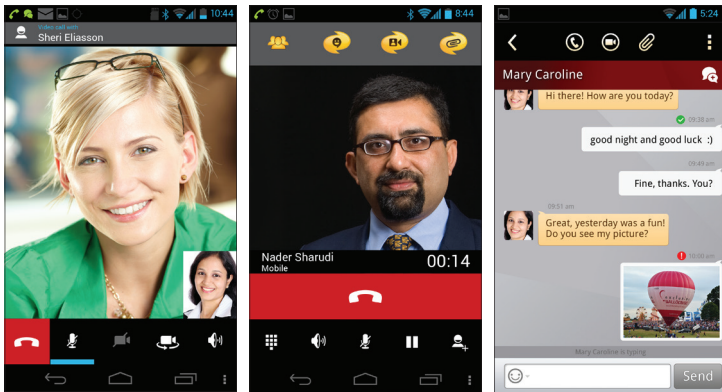
### mCUE 4G and vPort™ 4G+ VoLTE/IR.94 Video Call/RCS

#### Native, Modem-embedded, and Downloadable

4G deployments are revolutionizing the user experience and improving carrier profitability. VoLTE and Rich Communication Services (RCS) have already been deployed globally by multiple lead operators, and continues to gain momentum. D2's field proven IMS product line, with demonstrated interoperability with major operators and IMS infrastructure vendors, has been integrated with OEM devices, Application Processor (AP) SoCs, and single-mode and multi-mode LTE modem ICs, providing carrier-grade VoLTE/SMSoIP, RCS, IR.94 Video call, and WiFi IP communications.

#### mCUE 4G: Complete Native IMS Client Solution: VoLTE, IR.94, and RCS

mCUE 4G is the most advanced embedded IMS IP communications software solution for the Android OS platform, supporting IR.92 VoLTE, IR.94 video call, and RCS GSMA standards. Additionally, it provides best-effort RCS Voice and Video communications over 3G data and WiFi networks.



mCUE 4G is a complete communications client solution with a modular and flexible architecture. It provides all layers from the UI, protocol stacks, and a fully embedded HD VoIP engine with support for wideband CODECs, to an optimized video engine that supports native hardware acceleration. mCUE 4G is tightly integrated and optimized for the Android OS platform to provide carrier-grade HD voice and video quality, native dialer, an address book, and RCS functions.

#### vPort 4G+: Complete VoLTE and SMSoIP engine with extensions for RCS and Video calling

The vPort 4G VoLTE engine provides carrier-grade voice and SMSoIP services via a voice engine and IMS stack that can be embedded into the LTE modem or AP. vPort 4G enables integration under the Android RIL which allows for minimal impact on the Android Framework.

vPort 4G's Radio Policy manager allows for calls to be initiated or received on Circuit Switched (CS) networks, or Packet Switched (PS) networks such as LTE or WiFi

while maintaining a seamless "cellular" call experience in the Android telephony UI. The optional vPort 4G+ enhancement provides patents-pending advanced architecture and APIs to enable RCS, Video call, and WiFi offload applications running on the AP, with a single IMS registration to the service provider.

D2 has meticulously designed mCUE 4G and vPort 4G/4G+ for carrier-grade voice and video quality by leveraging the best of the system's resources: Audio path optimizations reduce latency; power management optimizations allow cellular calling to be completely handled via the modem; ability to escalate a voice call to video. Furthermore, the flexible architecture allows for subset of features to be deployed in phases.

#### Product Line Summary

##### mCUE 4G – Native RCS, VoLTE (IR.92), & Video Call (IR.94)

- Device-embedded implementation with tight Android framework integration to provide carrier grade VoLTE, Video calling, and RCS joyn capabilities via a native user experience
- Native dialer and contacts with joyn capabilities for both Circuit Switched (CS) and Packet Switched (WiFi or LTE) calling, Service Capability Discovery, and media/file share
- WiFi Offload for Voice, RCS, and Video call integrated into the Android framework

##### vPort 4G+ – Embedded VoLTE and SMSoIP (IR.92)

- Embedded QoS enabled IR.92 HD VoLTE/SMSoIP engine with IMS stack, and optional extensions that enable RCS, WiFi calling and IR.94 HD Video calling
- Patent pending single IMS registration with advanced APIs for VoLTE and RCS functionality
- Modular and flexible architecture with implementation on modem or Application Processor

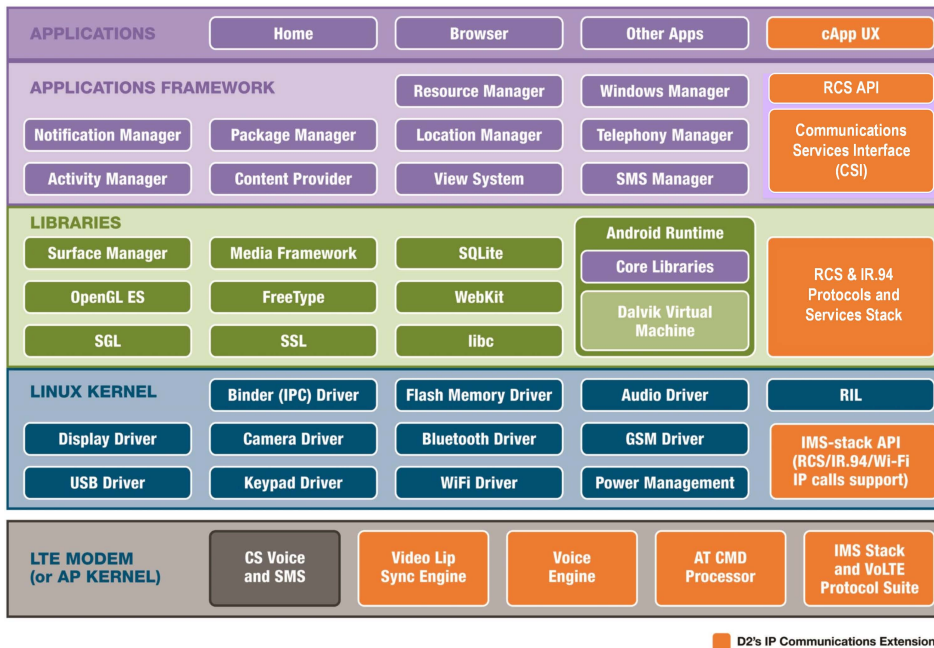
##### mCUE 4G DLC (Downloadable Client)

- GSMA joyn accredited downloadable "OTT" Android client
- Fastest time to market for RCS, best effort Voice, and Video calling across CS or PS networks
- Customizable for unique requirements of operators

#### mCUE 4G Downloadable Client

The downloadable mCUE 4G client allows operators to easily and efficiently launch IMS services to their installed base of subscribers. It includes many of the key features of the Native/embedded version, such as real-time IP voice and video communications, SMS over IP and RCS capabilities. It enables operators to offer legacy voice and SMS services over WiFi or 3G/4G mobile data connections and add rich IP communications services such as IM, file/media share, presence, video call/share, and capabilities exchange. Additionally, it provides operators a migration path to Native implementations using mCUE 4G and vPort 4G+.

mCUE Functional Diagram



## mCUE Key Features

### IR.92 VoLTE/SMSoLTE

- Minimal impact to Android framework: Integration on modem or AP that supports under the Android RIL implementation
- Comprehensive call features: Hold, mute, merge, split, swap, audio sourcing, pause, wait, etc.
- Supplementary Services: Caller ID presentation and block, Call Forwarding – always, on busy, when unregistered, on no answer, Do Not Disturb, Multi-Party Conference, and Message waiting indication

### RCS, IR.94 Video Call and WiFi Offload

- Instant Messaging (IM) with multi-user chat, Video share and File/Media Share during CS and PS calls
- Patent-pending architecture that integrates IR.92 VoLTE with RCS, IR.94 video call and/or WiFi calling with a single IMS registration
- IR.94 HD video call and conferencing with QoS
- Best-effort RCS VoIP and V2oIP call over WiFi, 3G data, or LTE default bearer
- Seamless native UX: Native dialer and contact list, history, and session log, with joyn capable multi-service presence display

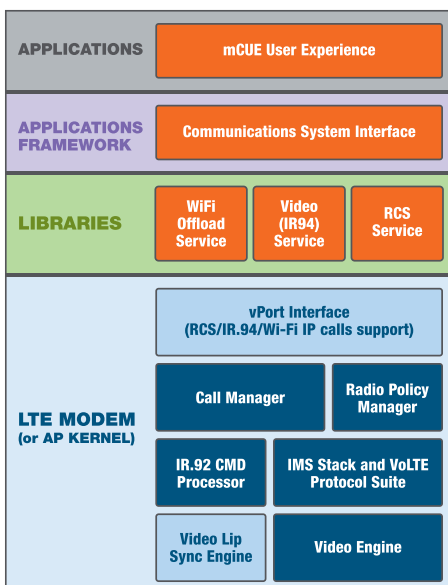
### Voice Call Continuity

- CS-PS(IP) DR/SR-VCC and IP-IP seamless call handoff
- Intelligent multi-radio monitoring and management
- Smart Fixed Mobile Convergence (FMC) and WiFi Offload with handoff algorithm on the Applications Processor

### HD Voice and Video Engines

- CPU optimized software HD audio/video codecs or native hardware acceleration support
- Complete wideband media engine framework with PLC, Adaptive JB, AEC, VAD, etc.
- Carrier-grade HD voice quality by optimizing Android audio path for minimum latency and jitter

## Complete Android Framework and Linux Kernel Integration



- Native UX: Complete “phoneapp & contacts” UI replacement for IR.92 VoLTE, IR.94 video and RCS modes seamlessly integrated with legacy CS modes
- CSI: Call/Session processor, Account Management, capability discovery/presence, IM
- Advanced IMS services middleware modules
- Select which services to support based on OEM/operator requirements
- Provide single IMS registration for simultaneous VoLTE, IR.94 and RCS
- Enables RCS, IR.94 and WiFi call extensions to leverage vPort voice engine and IMS stack in modem or AP Kernel
- IMS and IR.92 VoLTE stack
- Modem (or Kernel) embedded HD voice engine: Codecs, Acoustic Echo cancellation, Packet Loss compensation (PLC), Dynamic Jitter buffer (JB)
- Packet processing (RTP, SRTP, RTCP)
- Radio policy engine & VCC (SR and DR)
- Optimized low-latency audio path drivers
- AV Sync for Video engine

mCUE 4G vPort 4G vPort 4G+ Extensions

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