USCC TOPS IA IR0328 Volte Inbound and Outbound Roaming

uscc

Impact Assessment (IA)

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# Introduction

## Purpose and Scope

The purpose of this document is to describe the proposed solution for the Change Request IR0328 and all its related information.

This document is used as input to the Design and/or Construct stages including their documentation; for example, Functional Specification, IDD, Detailed Design, Test Plan, and Test Design.

## Related Documentation

| DC # | Document Name |
| --- | --- |
| 2682846 | USCC TOPS HLS IR0300.2 VoLTE Commercialization Track 2 |
| 2664384 | USCC TOPS HLS IR0328 Volte Inbound and Outbound Roaming |
| 2675958 | VoLTE Inbound and Outbound Roaming BRD (IR-328) |
| 2009221 | USCC LTE Roaming - External IDD APRM – NDC |

## Terms and Definitions

| Term | Definition |
| --- | --- |
| MSS | Mobile Session Service |
| QCI | QoS Class Identified |
| CTL2 | CallTypeLevel2 |
| QoS | Quality of Service |
| APN | Access Point Name |
| APN-NI | APN Network Identifier |
| APN-OI | APN Operator Identifier |
| IDD | Interface Document Design |
| OUTD | Outcollect Unrated Data interface (NDC🡪APRM) |
| DISP | Outcollect Rated Data Interface (APRM🡪ARCM) |
| OUTS | Outcollect Summary Interface (ARCM🡪APRM) |
| INCS | Incollect Summary Interface (ARCM🡪APRM) |
| VoLTE | Voice Over LTE |
| LTE | Long Term Evolution |
| HPMN | ARCM component responsible for outbound roaming processing |
| VPMN | ARCM component responsible for inbound roaming processing |

# Requirements

## Current Functionality

### Current Functionality

There are a number of VoLTE projects (e.g. Enablement, Reporting, Device Enablement, and Commercialization) that have or will have laid the groundwork for the Commercialization of VoLTE in 2017. Currently, USCC customers are unable to roam on another carrier’s VoLTE network and customers from other carriers are unable to roam on USCC’s VoLTE network.

Current State:

* TMo has nationwide VoLTE and nearly 40% of calls made on the TMo network are on VoLTE (as of December 2015)
* AT&T has deployed VoLTE in 30 U.S. states (as of December 2015)
* TMo and AT&T launched video calling in 2015
* Verizon launched voice and video service nationwide in 2015 and has over 4 million customers using VoLTE (as of August 2015)
* Sprint is expected to lag TMo, AT&T and Verizon.  They have yet to publicly announce a launch date.
* USCC is currently conducting a VoLTE trial and is expected to commercially deploy VoLTE in IA in early 2017

### Reasons for Change

USCC® is looking to invest in the future by protecting/growing our inbound roaming revenue stream as well as offering our subscribers a VoLTE experience on a national scale. The VoLTE Commercialization project is slated to complete Iowa in early 2017 (commercial launch) with other markets to follow thereafter. The project enables US Cellular® to develop relationships with new partners (GSM carriers) and also gives us better leverage to negotiate competitive roaming agreements with existing partners. Offering VoLTE is imperative to our ability to negotiate favorable pass-thru rates.

### Business Impact

The key objectives are to protect/grow our inbound roaming revenue stream for customers on the VoLTE network, as well as to provide a positive customer experience at a low pass thru rate for our own subscribers

* Protect VZW and Sprint inbound roaming revenue streams as those carriers evolve their own ecosystems to a VoLTE solution
* Potential for AT&T and TMO to place substantial traffic on our network
* National VoLTE footprint to offer our subscribers

## Traceability Matrix

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Req ID # | Priority | Responsibility | Requirement | Main Application | Impacted Applications | Covered in Section |
| VIOR\_3.1.1 | P0 | USCC | Domestic carrier subscribers (prepaid and post-paid) who have VoLTE roaming agreement(s) with USCC will be able to VoLTE roam on USCC’s network. | N/A | N/A | N/A |
| VIOR\_3.1.2 | P0 | USCC | USCC will not distinguish if an inbound VoLTE roaming subscriber is prepaid or postpaid. | N/A | N/A | N/A |
| VIOR\_3.1.3 | P0 | ENGR | All VoLTE inbound roaming traffic will be routed back to the home carrier’s network. (local break out not supported as part of IR0328)  Note: 911 only will be treated as Local breakout. | N/A | N/A | N/A |
| VIOR\_3.1.4 | P0 | ENGR | USCC will be able to associate the identity of QoS requested for a particular service for possible identification of services the roaming customer used, per roaming partner. | N/A | N/A | N/A |
| VIOR\_3.1.5 | P0 | USCC, ENGR | Inbound roaming VoLTE services will be categorized by QCI/APN values, as required by the roaming partner. (requirement updated per CR-ID-5) | N/A | N/A | N/A |
| VIOR\_3.1.6 | P0 | ENGR | The APN NI value will be passed from the network to the billing system in order to populate the APN NI field in the TAP record. | N/A | N/A | N/A |
| VIOR\_3.1.7 | P0 | ENGR | The network will support at a minimum QCI values 1 through 9. | N/A | N/A | N/A |
| VIOR\_3.1.7.A | P0 | ENGR | The network will support a common set APN values based on industry standards.  Note: List will be determined in design. | N/A | N/A | N/A |
| VIOR\_3.1.8 | P0 | ENGR | The network will ensure the QoS (guaranteed level of service) parameters of roaming subscribers are within the limits of the roaming agreement. | N/A | N/A | N/A |
| VIOR\_3.1.9 | P0 | Amdocs | USCC will have the ability to charge different rates for each QCI / APN value. | APRM | N/A | 4.2.2 |
| VIOR\_3.1.9.1 |  | USCC | Rates per QCI/APN will be determined before launch. | N/A | N/A | N/A |
| VIOR\_3.1.10 | P0 | USCC | The following are the VoLTE services that ~~USCC’s network will support for inbound roamers.~~ U.S. Cellular expects our roaming partners will enable for their customers in a roaming environment.  We should, therefore, expect inbound roamers will use these services while VoLTE roaming on USCC:  (requirement updated per CR-ID-5) | N/A | N/A | N/A |
| VIOR\_3.1.10.1 | P0 | USCC | ~~USCC’s network will support~~ VoLTE voice calls, non HD. (requirement updated per CR-ID-5) | N/A | N/A | N/A |
| VIOR\_3.1.10.2 | P0 | USCC | ~~USCC’s network will support~~ HD VoLTE voice calls. (requirement updated per CR-ID-5) | N/A | N/A | N/A |
| VIOR\_3.1.10.3 | P0 | USCC | ~~USCC’s network will support VoLTE conference calls, up to 6 people, including HD.~~VoLTE conference calls including HD (# of participants allowed on conference call to be defined by home carrier)  Note: VoLTE conference call settings will be determined by the roaming partner.~~roaming partner controls the number of people allowed on the conference call.~~  (requirement updated per CR-ID-5) | N/A | N/A | N/A |
| VIOR\_3.1.11 | P0 | ENGR | USCC’s network will support VoLTE E911 (E911 over IMS) voice calls. | N/A | N/A | N/A |
| VIOR\_3.1.11.1 | P0 | USCC, ENGR | E911 will be local breakout for inbound roaming due to a government mandate. | N/A | N/A | N/A |
| VIOR\_3.1.11.2 | P0 | ENGR | USCC will generate ECSCFRecords for roamers.  Example: (AT&T subscribers on the USCC network) | N/A | N/A | N/A |
| VIOR\_3.1.11.2.1 | P0 | Mediation | E911 ECSCFRecords for inbound roaming subscribers will be obtained from the E-CSCF/CDF. | N/A | N/A | N/A |
| VIOR\_3.1.11.2.1.1 | P0 | Mediation | E-911 voice CDRs will be transferred to APRM in the APRM format. | N/A | N/A | N/A |
| VIOR\_3.1.11.2.1.1.1 | P0 | Mediation | Records without subscriber identity will be sent to Call Dump only.  Note: There will not be any wholesale rating for these calls. | N/A | N/A | N/A |
| VIOR\_3.1.11.2.1.2 | P0 | ENGR,  Mediation | The ECSCFRecord for inbound E-911 will be time-based, not volume. | N/A | N/A | N/A |
| VIOR\_3.1.11.2.2 | P0 | Amdocs, Mediation | Data bearers listed below consumed during an E911 call will be rated based on the contract negotiations and included in the TAP file.   * Voice - 0 rated or wholesale rated * Signaling - 0 rated or wholesale rated * Video – 0 rated or wholesale rated | APRM | N/A | 4.2.2 |
| VIOR\_3.1.11.2.3 | P0 | Amdocs | E-911 Voice CDRs will be $0 rated as part of wholesale settlement. | APRM | N/A | 4.2.2 |
| VIOR\_3.1.11.2.4 | P0 | Amdocs | E-911 calls made by roaming subscribers on the USCC network will be included in the TAP exchange with partner carriers. | ARCM | APRM | 4.1.3 |
| VIOR\_3.1.11.2.3.1 | P0 | USCC | TAP Record types will be determined during contract negotiations for all 3 bearers (Voice, Video and Signaling) as well the as voice call). | N/A | N/A |  |
| VIOR\_3.1.11.3 | P0 | Mediation, ENGR | There will not be duplicate billing of the bearer records. (SGW or PGW, not both) | N/A | N/A | N/A |
| VIOR\_3.1.12 | P0 | USCC, Billing Technical OPS | All E911 calls will be stored in the Call Dump.  Exception Outbound E911 calls will be handled the same as circuit switch outbound calls. | N/A | N/A | N/A |
| VIOR\_3.1.12.1 | P0 | Mediation | E911 ECSCFRecords will be transferred to Call Dump. | N/A | N/A | N/A |
| VIOR\_3.1.A | P0 | ENGR | The necessary configuration changes will be made in order to enable E911 over IMS. (requirement added per CR-ID-5) | N/A | N/A | N/A |
| VIOR\_3.1.B | P0 | USCC | E911 over IMS will be implemented with roaming partners. (requirement added per CR-ID-5) | N/A | N/A | N/A |
| VIOR\_3.1.15 | P0 | ENGR | Data for an inbound VoLTE roaming customer will not be throttled. | N/A | N/A | N/A |
| VIOR\_3.1.16 | P0 | ENGR | Serving location information will be available on all inbound roaming network (PGW & SGW) records.  The Serving BID field in the TAP record can also be used for location information if the serving carrier populates this field. (Requirement updated per CR-ID-65) | N/A | N/A | N/A |
| VIOR\_3.1.16.1 | P0 | Mediation | If the Serving location (ULI) is empty the Serving node address in APRM record will be updated with a predefined SID value which is contained in the existing reference table to accommodate VoLTE Roaming until a full solution is available from Engineering. | N/A | N/A | N/A |
| VIOR\_3.1.16.2 | P0 | USCC | When a SID value is modified mediation will be notified. | N/A | N/A | N/A |
| VIOR\_3.1.16.3 |  | ENGR | When the key field IP address (SGSN) is modified mediation will be notified. | N/A | N/A | N/A |
| VIOR\_3.1.17 | P0 | USCC | A reconciliation process will be defined for inbound roaming data against the third party data | N/A | N/A | N/A |
| VIOR\_3.1.17.1 | P0 | USCC, Amdocs | Daily reconciliation between APRM and DCH | To be removed (CR61) | To be removed (CR61) | To be removed (CR61) |
| VIOR\_3.1.17.1.2 | P0 | Amdocs | APRM: Total Volume and Dollars by Carrier, TAP filename, QCI and APN | To be removed  (CR61) | To be removed  (CR61) | To be removed  (CR61) |
| VIOR\_3.1.17.1.3 | P0 | USCC | DCH: Total Volume and Dollars by Carrier, TAP filename, QCI and APN | N/A | N/A | N/A |
| VIOR\_3.1.17.1.4 | P0 | USCC | Daily notification of the reconciliation | N/A | N/A | N/A |
| VIOR\_3.1.17.2 | P0 | USCC, Amdocs | Bi-monthly reconciliation between SAP and APRM | To be removed  (CR61) | To be removed  (CR61) | To be removed  (CR61) |
| VIOR\_3.1.17.2.1 | P0 | USCC | SAP: Total Dollars by Company Code by GL Account | N/A | N/A | N/A |
| VIOR\_3.1.17.2.2 | P0 | Amdocs | APRM: Total Dollars by Company Code by Service Type | To be removed  (CR61) | To be removed  (CR61) | To be removed  (CR61) |
| VIOR\_3.1.17.2.3 | P0 | USCC, Amdocs | BI-monthly notification of the reconciliation | To be removed  (CR61) | To be removed  (CR61) | To be removed  (CR61) |
| VIOR\_3.1.18 | P0 | Amdocs, Mediation | The APN field will be populated in TAP records. | APRM | ARCM | 4.2.2 |
| VIOR\_3.1.18.1 | P0 | Amdocs, Mediation | The APN NI will be utilized. | APRM | ARCM | 4.2.2 |
| VIOR\_3.1.19 | P0 | Billing Technical OPS | Records from the S-gateway for VoLTE inbound records will be stored in the Call Dump for one year. (in alignment with storage of LTE records) | N/A | N/A | N/A |
| VIOR\_3.1.19.  1 | P0 | Mediation | Mediation will transfer inbound roaming SGW records to Call Dump. | N/A | N/A | N/A |
| VIOR\_3.1.20 | P0 | USCC | USCC subscribers will have the ability to VoLTE roam on another carrier’s network that USCC has roaming agreements with. | N/A | N/A | N/A |
| VIOR\_3.1.20.1 | P0 | USCC | USCC customers enabled on VoLTE in their home market will have the ability to roam. | N/A | N/A | N/A |
| VIOR\_3.1.20.2 | P0 | USCC | LTE roaming will be established as a precondition for VoLTE roaming. | N/A | N/A | N/A |
| VIOR\_3.1.21 | P0 | USCC, ENGR | USCC VoLTE roaming subscribers will receive all VoLTE services available to them when they are in the USCC network. | N/A | N/A | N/A |
| VIOR\_3.1.22 | P0 | USCC | USCC will be able to identify the foreign carrier that the USCC subscriber’s data session took place on. | N/A | N/A | N/A |
| VIOR\_3.1.23 | P0 | ENGR | Voice data for an outbound VoLTE roaming customer will not be throttled. | N/A | N/A | N/A |
| VIOR\_3.1.24 | P0 | Amdocs, ENGR | Video calling/conferencing data for an outbound roaming customer will be throttled, per existing roaming throttling rules. | BAU | BAU | 3.2.1 |
| VIOR\_3.1.24.1 | P0 | ENGR | If a customer is throttled for video calling, the voice portion of a VoLTE call will be available. | N/A | N/A | N/A |
| VIOR\_3.1.25 | P0 | USCC | USCC VoLTE customers will have the ability to place a 911 call when roaming.  Note: This will be handled by Local breakout at the serving carrier. | N/A | N/A | N/A |
| VIOR\_3.1.26 | P0 | USCC | Serving location information will be available on all outbound roaming records. | N/A | N/A | N/A |
| VIOR\_3.1.26.1 | P0 | Amdocs | Outbound: Location information from the TAP will be mapped in APRM and ARCM. (SBID)  Note: Mapping will be determined in design. | ARCM | APRM | BAU 3.3.1.1.2 |
| VIOR\_3.1.26.2 | P0 | USCC, ENGR | At minimum, the TAI must be available within the ULI over S8 from the foreign SGW to the home PGW (whether home PGW or NOC). | N/A | N/A | N/A |
| VIOR\_3.1.26.3 | P0 | USCC, ENGR | If the serving location is not available for the record our ability to provide location is degraded. | N/A | N/A | N/A |
| VIOR\_3.1.27 | P0 | USCC | VoLTE roaming partners will categorize services by QCI values. | N/A | N/A | N/A |
| VIOR\_3.1.28 | P0 | USCC | A reconciliation process will be defined for VoLTE roaming data. | N/A | N/A | N/A |
| VIOR\_3.1.28.1 | P0 | USCC, Amdocs | Daily reconciliation between APRM and DCH | To be removed  (CR61) | To be removed  (CR61) | To be removed  (CR61) |
| VIOR\_3.1.28.1.1 | P0 | Amdocs | APRM: Total Volume and Dollars by Carrier, TAP filename, QCI and APN | To be removed  (CR61) | To be removed  (CR61) | To be removed  (CR61) |
| VIOR\_3.1.28.1.2 | P0 | USCC | DCH: Total Volume and Dollars by Carrier, TAP filename, QCI and APN | N/A | N/A | N/A |
| VIOR\_3.1.28.1.3 | P0 | USCC, Amdocs | Daily notification of the reconciliation | To be removed  (CR61) | To be removed  (CR61) | To be removed  (CR61) |
| VIOR\_3.1.28.2 | P0 | USCC Amdocs | Bi-monthly reconciliation between SAP and APRM | To be removed  (CR61) | To be removed  (CR61) | To be removed  (CR61) |
| VIOR\_3.1.28.2.1 | P0 | USCC | SAP: Total Dollars by Company Code by GL Account | N/A | N/A | N/A |
| VIOR\_3.1.28.2.2 | P0 | Amdocs | APRM: Total Dollars by Company Code by Service Type | To be removed  (CR61) | To be removed  (CR61) | To be removed  (CR61) |
| VIOR\_3.1.28.2.3 | P0 | USCC, Amdocs | BI-monthly notification of the reconciliation | To be removed  (CR61) | To be removed  (CR61) | To be removed  (CR61) |
| VIOR\_3.1.28.3 | P0 | USCC | Daily reconciliation of total volume by day between USCC’s network reading and DCH readings. | N/A | N/A | N/A |
| VIOR\_3.1.28.3.1 | P0 | USCC | PGW: Total volume by day | N/A | N/A | N/A |
| VIOR\_3.1.28.3.2 | P0 | USCC | DCH: Total volume by day | N/A | N/A | N/A |
| VIOR\_3.1.28.3.3 | P0 | USCC | Daily notification of the reconciliation | N/A | N/A | N/A |
| VIOR\_3.1.29 | P0 | USCC | Roaming partners will be responsible for storing E911 calls. | N/A | N/A | N/A |
| VIOR\_3.1.29.1 | P0 | USCC | Roaming partners will include or exclude E911 voice calls based on the agreement in their TAP file exchanges with USCC | N/A | N/A | N/A |
| VIOR\_3.1.29.1.1 | P0 | USCC, Amdocs | TAP Record types will be determined during contract negotiations for all 3 bearers (Voice, Video and Signaling) as well the as voice call). | ARCM | APRM | 4.1.2, 3.2.2 |
| VIOR\_3.1.29.2 | P0 | USCC | Subpoena process for E-911 calls made while roaming will be revised during active phase. | N/A | N/A | N/A |
| VIOR\_3.1.29.3 | P0 | USCC | E-911 voice calls made by USCC subscribers on a roaming partner’s network will be 0 rated by the roaming partner based on the agreement. | N/A | N/A | N/A |
| VIOR\_3.1.29.4 | P0 | USCC | Data consumed during the VoLTE E911 call made by the USCC subscriber while roaming will be included in wholesale settlement by the partner carrier based on the agreement. | N/A | N/A | N/A |
| VIOR\_3.1.29.5 | P0 | USCC, Mediation | USCC subscribers will not be retail billed for their E911 call placed while roaming. | N/A | N/A | N/A |
| VIOR\_3.1.30 | P0 | Billing Operations | All VoLTE calls will be stored in the Call Dump. | N/A | N/A | N/A |
| VIOR\_3.1.30.1 | P0 | Mediation | Mediation will transfer all calls to Call Dump (all bearers). | N/A | N/A | N/A |
| VIOR\_3.1.31 | P0 | USCC, ENGR | USCC customers will have presence capability when roaming if supported by the home network. | N/A | N/A | N/A |
| VIOR\_3.1.32 | P0 | USCC, ENGR, Amdocs | The precondition for VoLTE roaming is the subscriber’s home market should be one where USCC has enabled VoLTE (i.e. initially, Iowa) as well as the market is authorized for VoLTE roaming and the customer is roaming in a market where our roaming partner has also enabled VoLTE/VoLTE roaming ~~subscriber is in a VoLTE enabled market.~~ (requirement updated per CR-ID-5) | CRM | OMS  EPC | 3.2.2 |
| VIOR\_3.1.C | P0 | USCC, ENGR | All USCC outbound VoLTE roaming traffic will be routed back to USCC’s network. (local break out not supported as part of IR0328)  Note: 911 only will be treated as Local breakout. | N/A | N/A | N/A |
| VIOR\_3.1.33 | P0 | USCC | VoLTE roaming voice usage and LTE data usage respectfully will appear on the bill and on MyAccount as it does today for CDMA roaming voice and LTE roaming data usage.  Note: As part of IR0328 Roaming traffic will be Home Routed and usage incurred by the subscriber will be billed and display as it does today in CDMA. | N/A | N/A | N/A |
| VIOR\_3.1.33.1 | P0 | USCC | Mediation will be provided with the TAI lists obtained from partner carriers.  Note: This will ensure that location data is correct in USCC Systems. | N/A | N/A | N/A |
| VIOR\_3.1.34 | P0 | Amdocs | VoLTE roaming voice usage and LTE data usage respectfully will appear in CIM as it does today for CDMA roaming voice and LTE roaming data usage.  Note: As part of IR0328 Roaming traffic will be Home Routed and usage incurred by the subscriber will be billed and display as it does today in CDMA. | RLC | CRM | 3.2.1 |
| VIOR\_3.1.34.1 | P0 | Amdocs | The following items will display for calls details in the Events tab in TOPS as they do today:   * Event Type * Start Time * Period * Roaming Indicator * Serving SID * Serving Area * Int. * City Called * State * Feature * M2M * Number Called * Unit * Msgs * Air * Toll * Add’l * Surcharge * Tax   Total | RLC | CRM | 3.2.1 |
| VIOR\_3.1.35 | P0 | USCC | There will be no new charge codes for domestic (U.S. carriers) inbound and outbound roaming. | N/A | N/A | N/A |
| VIOR\_3.1.36 | P0 | USCC | Fraud X will be tested for roaming traffic. | N/A | N/A | N/A |
| VIOR\_3.1.37 | P0 | USCC | VoLTE video data traffic will be the only VoLTE data traffic considered for data analysis. | N/A | N/A | N/A |
| VIOR\_3.1.38 | P0 | USCC, Mediation | If new drop reason codes and error codes within mediation are created, revenue assurance will be notified. | N/A | N/A | N/A |
| VIOR\_3.1.38.1 | P0 | Mediation | If new drop reason codes are created they will be updated in the BRM database table. | N/A | N/A | N/A |
| VIOR\_3.1.39 | P0 | ENGR | If new network elements (usage related) are created, revenue assurance will be notified. | N/A | N/A | N/A |
| VIOR\_3.1.40 | P0 | USCC | Post IR0328, when USCC reaches a VoLTE roaming agreement with a foreign carrier, this project’s documentation will be leveraged for onboarding that carrier. This includes:   * Inbound Roaming agreements * Outbound roaming agreements * Devices (Note: The business process for obtaining devices will be followed)   New updated/processes | N/A | N/A | N/A |
| VIOR\_3.1.41 | P0 | Amdocs | ARCM will support multiple formats of the TAP including TD57 32.4.  Note 1: Current version GSMA TD.57 3.12 30.2  Note 2: TD57 defines the logical and physical data that must be transferred between PMNs under the Transferred Account Procedure (TAP). | ARCM | N/A | 4.1 |
| VIOR\_3.1.42 | P0 | Amdocs | ARCM will be backwards compatible to support other versions of TAP incase carriers cannot support TD57 32.4. | ARCM | N/A | 4.1 |
| VIOR\_3.1.43 | P0 | USCC, Amdocs | Only one TAP version will be utilized per carrier partner. | ARCM | N/A | 4.1 |
| VIOR\_3.1.44 | P0 | USCC | When an agreement with a new carrier partner is signed, a profile will be added in the ARCM console specifying the agreed upon tap version. | N/A | N/A | N/A |
| VIOR\_3.1.45 | P0 | USCC | An existing carrier partner’s profile in ARCM will be updated with the agreed upon TAP version when a new agreement is signed. | N/A | N/A | N/A |
| VIOR\_3.1.46 | P0 | Amdocs | Error records (i.e files) generated from APRM and ACRM will be augmented to include QCI and APN. | APRM | ARCM | 4.2.1  4.2.4  4.1.2  4.1.3 |
| VIOR\_3.1.47 | P0 | Amdocs | APRM will expand error checking to include APN and QCI values.  Note: This requirement covers any error checking including APN and QCI having the correct values while processing TAP files in APRM. | APRM | ARCM | 4.2.1  4.2.4  4.1.2  4.1.3 |
| VIOR\_3.1.48 | P0 | USCC, Amdocs | RAP processing will include new items APN and QCI | APRM | ARCM | 4.2.1  4.2.4  4.1.2  4.1.3 |
| VIOR\_3.1.49 | P0 | Amdocs | ARCM will have the ability to identify a VoLTE event based on APN value. | ARCM | N/A | 3.3.1.1; 4.1.2; 4.1.4 |
| VIOR\_3.1.50 | P0 | ENGR, Mediation | The TAS record (ASRecord) will contain the Access Network Identifier, coded per 3GPP TS 24.229 7.2A.4.3.  Note: For outbound, the serving PLMN is needed to populate the carrier id field in the UFF.  The PLMN is composed of the Mobile Country Code concatenated with the Mobile Network Code.  For inbound, the visitor IMSI must contain the home carrier PLMN value in order to convert to the value of the TADIG (Transfer Account Data Interchange Group) value which is needed for TAP-out. | N/A | N/A | N/A |
| VIOR\_3.1.51 | P0 | ENGR | “Traditional circuit switch fields” will be sent into the IMS core for CALEA enrichment is not applicable for this project.  Example: Device Identifier, IP addresses, location  Note: The customer for this information is the Call Dump for CALEA. In circuit-switch, the device identifier (ESN, MEID, IMEI) is available as well as the Serving System ID (a CDMA concept). In packet-switch, the IMS core can use the ANI to synthesize a SID but the device identifier is only available in the packet core. Consequently, Call Dump must correlate a packet core CDR to a IMS core CDR to enrich the record with the device identifier. New requirements will soon be introduced by 3GPP TS 33.108 where the packet-core CDR must contain the source and destination IP values and (optionally) the source and destination port numbers. | N/A | N/A | N/A |
| VIOR\_3.1.52 | P0 | Mediation | All records sent to APRM will also be sent to Call Dump. | N/A | N/A | N/A |
| VIOR\_3.2.1 | P0 | Amdocs | Accounting entries will be recorded systematically. | APRM | N/A | 4.2.3  4.2.6 |
| VIOR\_3.2.1.1 | P0 | Amdocs | Accounting transactions for retail billing of VoLTE roaming usage will be recorded as they are today for other roaming usage (BAU). | BAU | BAU | 3.2.1 |
| VIOR\_3.2.2 | P0 | USCC, Amdocs, Mediation | All activity will be appropriately mapped to the correct USCC company code based on the serving SID. | ARCM | N/A | BAU |
| VIOR\_3.2.2.1 | P0 | Amdocs | Outbound: ARCM will use the IMSI and map to the company code. | ARCM | N/A | BAU |
| VIOR\_3.2.2.2 | P0 | Mediation | Inbound: APRM will use the Serving SID to map to the company code.  Note: Serving SID utilized is created by Mediation. This is the same as LTE Roaming. | N/A | N/A | N/A |
| VIOR\_3.2.3 | P0 | Amdocs | The frequency of the ledger feed from APRM to SAP will be changed to twice a month for VoLTE and LTE records. | To be removed  (CR61) | To be removed  (CR61) | To be removed  (CR61) |
| VIOR\_3.2.4 | P0 | USCC | Settlement between the USCC and roaming partner(s) will follow the current process. | N/A | N/A | N/A |
| VIOR\_3.2.6 | P0 | USCC | Inter-carrier services team will add the initial rates for the different QCI/APN values in APRM.  Note: inbound roaming only | N/A | N/A | N/A |
| VIOR\_3.2.6.1 | P0 | Amdocs, USCC | Outbound: QCI ID’s/APN and descriptions will be added into APRM Inter-carrier services. | APRM | N/A | 4.2.4 |
| VIOR\_3.2.6.1.1 | P0 | Amdocs | Role based access will be provided to update the QCI ID’s/APN and descriptions. | APRM | N/A | 4.2.4 |
| VIOR\_3.2.6.1.1.1 | P0 | USCC | Associates who will require this role will be determined during design. | N/A | N/A | N/A |
| VIOR\_3.2.7 | P0 | USCC | A process team will be identified to maintain the QCI/APN values in APRM on an ongoing basis. | N/A | N/A | N/A |
| VIOR\_3.2.8 | P0 | USCC, Mediation | VoLTE roaming services will be rated per kb. 1 kb = 1024 bytes | N/A | N/A | N/A |
| VIOR\_3.2.10 | P0 | USCC, Amdocs, Mediation | Data consumed for video calling including conference calling (VoLTE) will be uniquely identifiable from all other data usage.  Note: We will not be able to distinguish between video and conferencing.  Note2: If APN based, this requirement cannot be supported for settlement. | APRM | N/A | 4.2.2 |
| VIOR\_3.2.10.1 | P0 | USCC, Mediation, ENGR | The data portion of a VoLTE video call will be identified as LTE data with QCI 7 in USCC systems. | N/A | N/A | N/A |
| VIOR\_3.2.11 | P0 | ENGR | USCC will generate Inbound VoLTE roaming usage records per the process designed with LTE Roaming with modifications in regards to the VoLTE record types (QCI/APN). | N/A | N/A | N/A |
| VIOR\_3.2.12 | P0 | Amdocs | APRM will receive inbound usage records per the process implemented with LTE Roaming with modifications in regards to the VoLTE record types (QCI/APN). . | APRM | N/A | 4.2.2 |
| VIOR\_3.2.12.1 | P0 | Amdocs | GSMA TD.57 3.12 30.2 CallTypeLevel2 will be used to capture the QCI value to determine the bearer for inbound roaming records as part of the GSMA standard. | APRM | N/A | 4.2.2 |
| VIOR\_3.2.12.2 | P0 | Amdocs | If APN is used, the APN NI field would be used to determine the type of service. (Service Examples: VoLTE, VoLTE Video, etc.) | APRM | N/A | 4.2.2 |
| VIOR\_3.2.13 | P0 | Amdocs | APRM will be able to support, at a minimum, QCI values 1-9. | APRM | N/A | 4.2.2 |
| VIOR\_3.2.13.1 | P0 | USCC, Amdocs | QCI mapping will be determined in the design phase for these QCI values. Example: values 20-29 in the TAP record | APRM | N/A | 4.2.2 |
| VIOR\_3.2.13.A | P0 | USCC, Amdocs | APRM will support a common set APN values based on industry standards.  Note: List to be determined in design. | APRM | N/A | 4.2.2 |
| VIOR\_3.2.13.A.1 | P0 | USCC, Amdocs | APN mapping will be determined in the design phase. | APRM | N/A | 4.2.2 |
| VIOR\_3.2.14 | P0 | Amdocs | APRM will be able to rate VoLTE inbound roaming data usage records. | APRM | N/A | 4.2.2 |
| VIOR\_3.2.15 | P0 | Admocs | APRM will be able to rate differently based on the QCI and APN value in the usage record. | APRM | N/A | 4.2.2 |
| VIOR\_3.2.16 | P0 | Amdocs | VoLTE inbound roaming services will be included and uniquely identifiable in the LTE roaming accumulation table; as designed in the LTE Roaming project. (APRM) | APRM | N/A | 4.2.2 |
| VIOR\_3.2.17 | P0 | Amdocs | Unique general ledger accounts will be used for VoLTE inbound roaming. | APRM | N/A | 4.2.3 |
| VIOR\_3.2.17.1 | P0 | USCC, Amdocs | A new GL code will be created for VoLTE Inbound Roaming | APRM | N/A | 4.2.3 |
| VIOR\_3.2.17.2 | P0 | USCC, Amdocs | One GL code will be utilized for all VoLTE Inbound roaming charges and will be provided by USCC. | APRM | N/A | 4.2.3 |
| VIOR\_3.2.17. 3 | P0 | USCC | A request will be submitted to TDS for a new GL code for VoLTE Inbound roaming.. | N/A | N/A | N/A |
| VIOR\_3.2.17.A | P0 | Amdocs | APRM will be able to handle inbound voice call records.  Example: E911 | APRM | N/A | 4.2.2 |
| VIOR\_3.2.17.B | P0 | Amdocs | ARCM will be able to distinguish between VoLTE and LTE data. | ARCM | N/A | 4.1.2  4.1.3 |
| VIOR\_3.2.17.C | P0 | Amdocs | The outcollect interface will take into account the additionally purposed call type level two field where the QCI value will be stored. | APRM | ARCM | 4.1.3  4.2.2 |
| VIOR\_3.2.17.D | P0 | Mediation | The locations to collect inbound roaming records will be Determine in design.  Note: possible locations (SGW or CDF) | N/A | N/A | N/A |
| VIOR\_3.2.17.E | P0 | Mediation | A CDR will be created in APRM format that includes the QCI and APN values. | N/A | N/A | N/A |
| VIOR\_3.2.17.F | P0 | Mediation | QCI will be located in the CallTypeLevel2 field | N/A | N/A | N/A |
| VIOR\_3.2.17.G | P0 | Mediation | APN NI will be utilized. | N/A | N/A | N/A |
| VIOR\_3.2.17.H | P0 | Mediation | Serving SID will be used to populate ServBid field in the record for APRM. | N/A | N/A | N/A |
| VIOR\_3.2.17.I | P0 | Mediation | The Service type identifier will be included that identifies if the service is LTE data or VoLTE. | N/A | N/A | N/A |
| VIOR\_3.2.17.J | P0 | Mediation | TAP files generated from ARCM will be sent to the Data clearing house (TNS). | N/A | N/A | N/A |
| VIOR\_3.2.17.K | P0 | Mediation | TAP files will not be mediated before sending to TNS. | N/A | N/A | N/A |
| VIOR\_3.2.17.L | P0 | Mediation | Files for APRM will include both VoLTE and LTE and be delivered to the same location as they are today.  Note: This shall use the same aggregation policies as LTE inbound roaming. | N/A | N/A | N/A |
| VIOR\_3.2.17.M | P0 | Mediation | Partial bearer records will be aggregated for inbound records. | N/A | N/A | N/A |
| VIOR\_3.2.17.N | P0 | Mediation | Mediation will determine VoLTE vs LTE by QCI value | N/A | N/A | N/A |
| VIOR\_3.2.19 | P0 | USCC | USCC will generate outbound VoLTE roaming usage records per the process designed with LTE Roaming and VoLTE Enablement with modifications in regards to the VoLTE record types.. | N/A | N/A | N/A |
| VIOR\_3.2.20 | P0 | Mediation, Amdocs | APRM will receive outbound usage records per the process implemented with LTE Roaming with modifications in regards to the VoLTE record types (QCI). . | APRM | ARCM | 4.2.5  4.1.2 |
| VIOR\_3.2.20.1 | P0 | USCC, Amdocs | GSMA TD.57 3.12 30.2 CallTypeLevel2 will be used to capture the QCI value to determine the bearer for outbound roaming records as part of the GSMA standard. | APRM | ARCM | 4.2.5  4.1.2 |
| VIOR\_3.2.20.2 | P0 | Amdocs | APN value will be located in the APN NI field in the TAP file. | APRM | ARCM | 4.2.5  4.1.2 |
| VIOR\_3.2.20.3 | P0 | Amdocs | A new service will be created for VoLTE Incollect. | APRM | N/A | 4.2.5 |
| VIOR\_3.2.21 | P0 | Amdocs | APRM will be able to support, at a minimum, QCI values 1-9. | APRM | N/A | 4.2.5 |
| VIOR\_3.2.21.1 | P0 | USCC, Amdocs | QCI mapping will be determined in the design phase for these QCI values. Example: values 20-29 in the TAP record | APRM | N/A | 4.2.5 |
| VIOR\_3.2.21.A | P0 | Amdocs | APRM will support a common set APN values based on industry standards.  Note: List to be determined in design. | APRM | N/A | 4.2.5 |
| VIOR\_3.2.21.A.1 | P0 | USCC, Amdocs | APN mapping will be determined in the design phase. | APRM | N/A | 4.2.5 |
| VIOR\_3.2.24 | P0 | USCC, Amdocs | Unique general ledger accounts will be used for VoLTE outbound roaming. | APRM | N/A | 4.2.6 |
| VIOR\_3.2.24.1 | P0 | USCC, Amdocs | A new GL code will be created for VoLTE Outbound Roaming | APRM | N/A | 4.2.6 |
| VIOR\_3.2.24.2 | P0 | USCC, Amdocs | One GL code will be utilized for all VoLTE Outbound roaming charges and will be provided by USCC. | APRM | N/A | 4.2.6 |
| VIOR\_3.2.24.2 | P0 | USCC | A request will be submitted to TDS for a new GL code for VoLTE Outbound roaming. | N/A | N/A | N/A |
| VIOR\_3.2.25 | P0 | Amdocs | APRM will have the ability to process outbound voice call records.  Example: E911 | APRM | N/A | 4.2.5 |
| VIOR\_3.2.26 | P0 | Mediation | TAP records will be collected from the DCH by Mediation as it’s done for LTE roaming today.  Note1: LTE Roaming (GPRS Call (GSMA TD.57 3.12 32.4, section 3.20). E-911 Voice call format will be determined in design  Note2: Settlement is based on volume (kb/mb). All 3 bearers (Voice, Video, and Signaling) will be included. | N/A | N/A | N/A |
| VIOR\_3.2.27 | P0 | Mediation | Retail bearer records will be collected in the PGWs located in the Regional Connectivity Centers (RCC) | N/A | N/A | N/A |
| VIOR\_3.2.27.1 | P0 | Mediation | Data utilization originating outside of the USCC network will continue to be flagged as roaming. | N/A | N/A | N/A |
| VIOR\_3.2.28 | P0 | Mediation | Voice signaling records will be extracted from the telephony server for outbound roaming calls. (ASRecord – 3GPP TS 32.298) | N/A | N/A | N/A |
| VIOR\_3.2.28.1 | P0 | Mediation | VoLTE voice records originating outside of the USCC network will be flagged a roaming. | N/A | N/A | N/A |
| VIOR\_3.2.29 | P0 | USCC, Mediation | The ULI indicator will be simulated if the ULI is not available.  Note: The ULI is synthesized in the seamless handover condition based upon an algorithm agreed to by inter-carrier services and business accounting for inter-company settlement. | N/A | N/A | N/A |
| VIOR\_3.2.30 | P0 | USCC, ENGR, Mediation | Needed versus optional fields will be determined using 3GPPTS 32.298 for the following items during contract negotiations with carriers:   * SGWRecord * PGWrecord * ASRecord, with Access-Network-Identifier * ECSCFRecord | N/A | N/A | N/A |
| VIOR\_3.2.30.1 | P0 | ENGR | The following fields are suggestions of needed values from Signaling from the S8 interface to be used in downstream processing:   1. **IMSI** –    1. Note: for basic TOPS guiding and rating 2. **MSISDN** –    1. Note**:** for FraudX – while FraudX expects 10-digit, full E.164 format is acceptable. 3. **User Location Information** –    1. **Note:** for synthesis of serving system ID (Serving SID) in TOPS  – TAI is mandatory       1. Bill presentment shows area in which charge is incurred       2. In-market roaming       3. Company settlement 4. **Serving Network** –    1. Note**:** for identification of the serving carrier PLMN.  This could be extracted from the TAI if not explicitly provided. Carrier ID. 5. **Charging Characteristics and/or APN** –    1. Note: for identification of pre-pay versus post-pay unless APN vectors to specific PGW for either.  While pre-pay may be out-of-scope currently, this will be needed when it (eventually) comes into scope.   Note: Finalized fields will be based on carrier partner negotiations. | N/A | N/A | N/A |
| VIOR\_3.2.31 | P0 | USCC, Mediation | VoLTE roaming usage will be included in the same files as LTE roaming usage.  Note: When VoLTE Roaming is launched with a carrier, all roaming records will be included in the file (LTE data and VoLTE). | N/A | N/A | N/A |
| VIOR\_3.2.32 | P0 | Mediation | VoLTE roaming will not require creation of new files for clearing house purposes. | N/A | N/A | N/A |
| VIOR\_3.2.33 | P0 | Mediation | TAC codes in outbound roaming usage will be mapped to SID.  Note: during UFF creation. | N/A | N/A | N/A |
| VIOR\_3.2.34 | P0 | USCC | SID to location descriptions will be provided by the Intercarrier services team.  Note: Due to the lack of time for additional research, we will move forward with this requirement knowing this could change post RD baseline. | N/A | N/A | N/A |
| VIOR\_3.2.34.1 | P0 | USCC | A process will be created to maintain the SID location descriptions going forward.  Attributes will be determined in design. Mediation team will help define those attributes. | N/A | N/A | N/A |
| VIOR\_3.3.1 | P0 | USCC | Inter-carrier Services will execute inbound VoLTE roaming agreements with domestic carriers. | N/A | N/A | N/A |
| VIOR\_3.3.1.1 | P0 | USCC | Mediation will have visibility into inbound roaming agreements with domestic carriers. | N/A | N/A | N/A |
| VIOR\_3.3.2 | P0 | USCC | Inter-carrier Services will execute outbound VoLTE roaming agreements with domestic carriers. | N/A | N/A | N/A |
| VIOR\_3.3.2.1 | P0 | USCC | Mediation will have visibility into outbound roaming agreements with domestic carriers. | N/A | N/A | N/A |
| VIOR\_3.3.3 | P0 | USCC | Roaming agreements will require legal review. | N/A | N/A | N/A |
| VIOR\_3.3.4 | P0 | USCC | Inbound VoLTE roaming services and corresponding QCI and/or APN values will be defined per roaming agreement. | N/A | N/A | N/A |
| VIOR\_3.3.5 | P0 | USCC | Outbound VoLTE roaming services and corresponding QCI and/or APN values will be defined per roaming agreement. | N/A | N/A | N/A |
| VIOR\_3.3.6 | P0 | USCC | Inter-carrier Services will work with Engineering on policy control set up per roaming agreement. | N/A | N/A | N/A |
| VIOR\_3.3.7 | P0 | USCC | The initial roaming partner will complete a VoLTE inbound roaming *trial* with USCC prior to implementation. | N/A | N/A | N/A |
| VIOR\_3.3.8 | P0 | USCC | Roaming partner(s) will complete market level testing with USCC prior to implementation. | N/A | N/A | N/A |
| VIOR\_3.3.9 | P0 | USCC | Create a document to capture the process for onboarding additional VoLTE roaming partners. | N/A | N/A | N/A |
| VIOR\_3.3.10 | P0 | USCC | Create a document to capture the process for onboarding additional USCC VoLTE markets. | N/A | N/A | N/A |
| VIOR\_3.3.11 | P0 | USCC | Launch with roaming partner. | N/A | N/A | N/A |
| VIOR\_3.3.12 | P0 | USCC | USCC® will contract with third party vendors (clearinghouse) that will provide settlement capabilities for USCC® and their roaming partner(s). | N/A | N/A | N/A |
| VIOR\_3.3.12.1 | P0 | USCC | Mediation will have visibility into third party vendors (clearinghouse) agreements. | N/A | N/A | N/A |
| VIOR\_3.3.14 | P0 | USCC | A designated clearing house (DCH & FCH) will be selected for each roaming partner. | N/A | N/A | N/A |
| VIOR\_3.3.15 | P0 | USCC | All LTE and VoLTE traffic for a roaming partner will flow through the same clearing house. | N/A | N/A | N/A |
| VIOR\_3.3.16 | P0 | USCC | Contracts will require legal review. | N/A | N/A | N/A |
| VIOR\_3.3.17 | P0 | USCC | The clearinghouse will serve as an intermediary for file exchanges between USCC® and their roaming partner(s). | N/A | N/A | N/A |
| VIOR\_3.3.17.1 | P0 | USCC | The DCH will follow the GSMA BA.12 standard (Section 3.2).  Note: BA.12 Transferred Account Procedure and Billing Information | N/A | N/A | N/A |
| VIOR\_3.3.18 | P0 | USCC | The clearinghouse will handle collections and payments on behalf of USCC. | N/A | N/A | N/A |
| VIOR\_3.3.19 | P0 | USCC | Clearinghouse will provide reconciliation reports, usage reports and RAP reports (daily and monthly) by carrier including (but not limited to) BID, TADIG, volume, charges, and QCI / APN values with associated usage.  Note: may be impacted based on decision for APN | N/A | N/A | N/A |
| VIOR\_3.3.20 | P0 | Mediation | Mediation will collect TAP files generated from ARCM and following the current process they will be passed to the clearinghouse. | N/A | N/A | N/A |
| VIOR\_3.3.21 | P0 | USCC | The clearinghouse will receive the TAP records, with the QCI / APN values, and validate the TAP record format. | N/A | N/A | N/A |
| VIOR\_3.3.22 | P0 | USCC | Exceptions will be reported back to USCC. | N/A | N/A | N/A |
| VIOR\_3.3.23 | P0 | USCC | Clearinghouse will send TAP records to roaming partner(s) per the current process. | N/A | N/A | N/A |
| VIOR\_3.3.24 | P0 | USCC | Settlement between the USCC and roaming partner(s) will follow the current process. | N/A | N/A | N/A |
| VIOR\_3.3.25 | P0 | USCC | For the TAP out records, the serving bid field will be populated. | N/A | N/A | N/A |
| VIOR\_3.3.26 | P0 | USCC | VoLTE usage will be reported separately from LTE | N/A | N/A | N/A |
| VIOR\_3.3.27 | P0 | USCC | VoLTE usage will be reported by Home and Serve SID/Market | N/A | N/A | N/A |
| VIOR\_3.3.28 | P0 | USCC | DCH reporting will support QCI values. | N/A | N/A | N/A |
| VIOR\_3.3.29 | P0 | USCC | DCH reporting will support APN values. | N/A | N/A | N/A |
| VIOR\_3.4.1 | P0 | USCC, Mediation, Billing Technical OPS | USCC CPNI guidelines will be followed for internal storage and transferring of all subscriber usage to and from the third party vendors. | N/A | N/A | N/A |
| VIOR\_3.5.1 | P0 | Amdocs | TOPS and related systems will account for the following:  (requirement added per CR-ID-5)  Note: Additional estimates will be handled in the PSA. | TACT | Infra | 9.1 |
| VIOR\_3.5.1.1 | P0 | Amdocs | Additional CDRs | TACT | Infra | 9.1 |
| VIOR\_3.5.1.2 | P0 | Amdocs | Additional roamers | TACT | Infra | 9.1 |
| VIOR\_3.5.1.3 | P0 | Amdocs | Additional MB volume | TACT | Infra | 9.1 |
| VIOR\_3.6.1 | P0 | USCC | The Cognos NDC Daily Audit report will be updated to include any new drop reason codes and/or error codes created within mediation. | N/A | N/A | N/A |
| VIOR\_3.7.1 | P0 | USCC | Any data consumed from VoLTE inbound roaming, using the KingStreet spectrum, will be included in the KingStreet reports. | N/A | N/A | N/A |
| VIOR\_3.7.2 | P0 | USCC | This usage will not be separated by QCI values, but will be aggregated together in the current reports. | N/A | N/A | N/A |
| VIOR\_3.8.1 | P0 | USCC | Production testing will test VoLTE inbound roaming using only production elements. | N/A | N/A | N/A |
| VIOR\_3.8.2 | P0 | USCC | Production testing will test VoLTE outbound roaming using only production elements. | N/A | N/A | N/A |
| VIOR\_3.8.3 | P0 | USCC | Production testing will occur prior to the launch of VoLTE inbound/outbound roaming. | N/A | N/A | N/A |
| VIOR\_3.8.4 | P0 | USCC | VoLTE data consumed during production testing will be excluded from settlement. | N/A | N/A | N/A |
| VIOR\_3.8.4.1 | P0 | USCC | TD TAP files will be created and the DCH and FCH will exclude them from settlement. | N/A | N/A | N/A |
| VIOR\_3.8.B | P0 | Engineering | LTE roaming records from TAP will be provided for testing. | N/A | N/A | N/A |
| VIOR\_3.8.C | P0 | Mediation | LTE Roaming data will be enhanced to include VoLTE attributes for testing.  Note: Partner Carrier Roaming test data will not be available until Q1-17. Exact attributes will be defined during design. | N/A | N/A | N/A |
| VIOR\_3.8.D | P0 | ENGR, Mediation | VoLTE roaming E911 records will be provided for testing.  Note: Mediation will be involved if VoLTE roaming E911 records are not available and on network VoLTE E911 records generated in the engineering lab need to be enhanced for testing. | N/A | N/A | N/A |
| VIOR\_3.8.D.1 | P0 | Mediation | If VoLTE roaming E911 records will not available for testing due to the timeframe, on network E911 records will be modified to simulate a VoLTE roaming E911 records. | N/A | N/A | N/A |
| VIOR\_3.8.5 | P0 | USCC | A friendly user trial (FUT) will be conducted for VoLTE inbound and outbound roaming, as part of production testing. | N/A | N/A | N/A |
| VIOR\_3.8.5.1 | P0 | USCC | Consumer bills will be generated during FUT to validate bill presentation. | N/A | N/A | N/A |
| VIOR\_3.8.5.1.1 | P0 | USCC | The consumer bills will include the following accounts: single line, family, business and shared data. | N/A | N/A | N/A |
| VIOR\_3.9.1 | P0 | USCC | U.S. Cellular® Marketing team will evaluate and create go-to-market strategies for the following channels: | N/A | N/A | N/A |
| VIOR\_3.9.1.1 | P0 | USCC | Direct Marketing | N/A | N/A | N/A |
| VIOR\_3.9.1.2 | P0 | USCC | Social Media | N/A | N/A | N/A |
| VIOR\_3.9.1.3 | P0 | USCC | Public Relations | N/A | N/A | N/A |
| VIOR\_3.9.1.4 | P0 | USCC | Collateral | N/A | N/A | N/A |
| VIOR\_3.9.1.5 | P0 | USCC | USCC.com | N/A | N/A | N/A |
| VIOR\_3.9.2 | P0 | USCC | VoLTE data coverage maps will be reviewed and updated as appropriate for VoLTE Roaming. | N/A | N/A | N/A |
| VIOR\_3.9.3 | P0 | USCC | A/OLR will have content changes and not need any structural changes made by IS | N/A | N/A | N/A |
| VIOR\_3.9.4 | P0 | USCC | “Job Aides” will be developed for VoLTE Roaming and available to associates to address general customer inquiries. (E.g. experience of speed, hand-offs/fringe markets and throttling) | N/A | N/A | N/A |
| VIOR\_3.9.5 | P0 | USCC | “FAQs” will be developed for VoLTE Roaming and available to associates to address general customer inquiries. | N/A | N/A | N/A |
| VIOR\_3.9.6 | P0 | USCC | New Buzz Articles will be created and posted to the OLR/AOLR. | N/A | N/A | N/A |
| VIOR\_3.9.7 | P0 | USCC | Existing policies and procedures will be reviewed and updated as appropriate. | N/A | N/A | N/A |
| VIOR\_3.9.8 | P0 | USCC | New policies and procedures will be created and posted to the OLR/AOLR. | N/A | N/A | N/A |
| VIOR\_3.9.9 | P0 | USCC | Roamer support training will be developed if needed. | N/A | N/A | N/A |
|  |  |  |  |  |  |  |

# Overall Solution

## Impacted Components

### Impacted Applications

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| OMS | CRM | RIM | MT | EPC | RLC | TC | A&F | CM | MCO |
|  |  |  |  |  |  |  |  |  |  |
| RPL | INV | AAM | AR | APRM | ARCM | SRM | Infra | Tact | MCSS |
|  |  |  |  | X | X |  |  |  |  |

### Potential Critical Data Flow

This section identifies the impact on applications due to critical data being updated, changed during the business process. Relevant data flow might be result with out of sync data between the respective applications. Further risk analysis and proper mitigation will be assessed during production readiness.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| OMS | CRM | RIM | MT | EPC | RLC | TC | v | CM |
|  |  |  |  |  |  |  |  |  |
| RPL | INV | AAM | AR | APRM | ARCM | SRM | Infra | Tact |
|  |  |  |  | X | X |  |  |  |

## Assumptions, Risks and Constraints

### Assumptions

* Structure of NDC🡪APRM unrated Outcollect interface will not change (OUTD).
* It will not be possible to setup distinct GL Codes per QCI/APN value
  1. The GL codes are defined at product level. The QCI value is a parameter within the product.
* Rating and accumulation currency for the VoLTE events will be USD. There will be no currency conversion.
* Video calling/conferencing data for an outbound roaming customer will be throttled per existing roaming throttling rules.
  1. Only the data portion of the Video calling/conferencing events will participate in the throttling functionality.

Note: For throttling rules please refer to “USCC Phase 1 IA CR149 Mobile Control”.

* There are no changes expected for Accounting transactions for retail billing of VoLTE roaming usage data.
* Incoming UFF record for VoLTE roaming usage will have the same structure as the VoLTE voice ,the Roaming Indicator attribute will have the value ‘Y’ to indicate the roaming event.
* Rating logic of the incoming VoLTE roaming events for US Cellular subscribers will follow the roaming CDMA voice rating
* The following attributes will be displayed for VoLTE roaming usage in calls details CIM screen, as it does today for other roaming usage:
  1. Event Type
  2. Start Time
  3. Roaming Indicator
  4. Serving SID
  5. Serving Area
  6. Int.
  7. City Called
  8. State
  9. Period
  10. Feature
  11. Msgs
  12. M2M
  13. Number Called
  14. Unit
  15. Air
  16. Toll
  17. Add’l
  18. Surcharge
  19. Tax
  20. Charge
* Current ARCM license does not covers projected volumes and should be handled outside of this project and it is pre-condition for full implementation of this CR

### Constraints and Dependencies

* ARCM must be updated to support TD57 32.4 (current ARCM version supports TD57 30.4). In the new TD version, the GPRS events’ duplication key has been modified, hence, once ARCM is updated, the previously stored event unique keys will no longer be valuable for identification of duplicate events. In scenario if CDR was sent earlier in TAP3.12 r30.4 format and then resent by the DCH in the TAP3.12 r32.4 format – such CDR will not be identified as duplicate although sent twice. Risk is added in chapter 12.
* IR300 will be implemented in the same release or earlier, allowing implementation of VoLTE commercialization solution by launch market (for details please refer to “USCC TOPS IA IR0300 VoLTE Commercialization”)
* It will be bilaterally agreed with roaming partners, which Call Record type will be used for VoLTE 911 calls, either the MOC or the MSS, but not both.
* The valid values for the bearers (Voice, Video and Signaling) should be aligned across with the roaming partners in advance. The different sets of values per vendor should be treated as CRs
* IR396 will be implemented before IR328 and APRM/ARCM will be configured properly to handle the volume baselined in IR396 and CR91

## High-Level Solution

### Solution Description per Functional Area

#### ARCM

The call type of VoLTE events will be identified either by value of APN or QCI values to Call Type Level 2

Identification of call type using QCI values will be implemented as following:

* TAP3.12 V32.4 support will be added in ARCM
* In ARCM Console, a new profile will be created for USCC partners with relevant agreements.
* A TAP 3.12 V32.4 processing flow will be added for both TAPIN and TAPOUT.
* TD57 CR1035 (‘Add QCI values to Call Type Level 2’) will be implemented in customization of ARCM on top of core product.

Identification of call type using APN will be implemented as following:

* In ARCM Console, a new profile will be created for USCC partners with relevant agreements.
* New reference table with APNs will be maintained for identification of VoLTE call type in TAPIN flow

Note

*APN-based identification of VoLTE call type does not require implementation of TAP3.12 r32.4. However, separate partner profile should be created for the partners with such agreement*

#### 

#### Outcollect

* ARCM will identify VoLTE events based on new ServiceType value and route them to the GPRSCall processing flow of TAPOUT.
* ‘Outcollect Summary file (OUTS)’ interface will be modified to accommodate CTL2 and APN.
* The OUTS formation process will be adjusted in ARCM to map the service type, APN and CTL2 fields as received in the Dispatcher (DISP) file from APRM.

#### Incollect

* ARCM will identify VoLTE events in the GPRSCall events on TAPIN either according to Call type Level2 values or by APN and route them to GPRS processing flow.
* VoLTE events will be passed to APRM as GPRSCall events in the INCS interface, with SERVICE TYPE set to ‘W’
* ‘Incollect Summary file (INCS)’ interface will be modified to accommodate CTL2.

#### APRM

#### Outcollect

* APRM will identify VoLTE events based on new ServiceType value received from NDC and guide the CDRs to the appropriate partner/rating schema
* Distinct rating will be possible for different values of QCI and/or APN
* There will be three new services for Outcollect: VoLTE Data (regular), VoLTE Data (from E911 call) and VoLTE MSS (for the voice part of E911)
  + Equivalent CD (Charge Data) and TD (Test Data) products will be created
* The new VoLTE feed will be reported in the same SAP GL extract currently existing for LTE Data Outcollect

#### Incollect

* APRM will identify VoLTE events coming from ARCM based on the new values of Service Type
* The charges will be accumulated in APRM accumulated usage tables as they come in the TAPIN file
* There will be two new services for Incollect: VoLTE Data and VoLTE MSS (for the voice part of E911)
  + Equivalent CD (Charge Data) and TD (Test Data) products will be created
* The new VoLTE feed will be reported in the same SAP GL extract currently existing for LTE Data Incollect

# Impacted Processes/ Components/Interfaces

## ARCM

### Patching

ARCM will be patched with latest patch level available.

### ARCM Management console

New TAP IN and TAP OUT profiles for TAP 3.12 V32.4 will be defined for USCC partners with relevant agreements.

Existing profiles will be modified accordingly since each partner can only be included in a single active profile per service.

CallTypeLevel2 core validation rule will be extended to accommodate additional valid values (20-29) as specified in TD75 CR1035: ‘Add QCI values to Call Type Level 2’.

The new profile will support all existing record types and the additional MSS event needed for Emergency calls reporting.

### ARCM Incollect

During mapping process (in the INCOLLECT mapper module) ARCM will identify VoLTE GPRS events in TAP IN file based on Call type Level2 values (20-29 as introduced in TD.57 CR1035) and/or the APN value.

This will be done by performing a query on SMM9\_BEARER\_MAP data (the table content is loaded and cached inside the mapper periodically), if matched, the record is identified as a VoLTE call and the relevant values are set in the APRM event (INCS interface):

* SERVICE TYPE = ‘L’ (new value for voice over LTE GPRS)

Emergency calls (E911) over LTE will be received on TAP IN files as MSS events and sent to APRM ,in INCS interface, with SERVICE TYPE = ‘W’. INCS includes an MSS filed to accommodate the MSS value on the event, which is expected to be ‘3’ for emergency calls.

D:\TEMPLATE\Note.gif new field to be added to ARCM->APRM interface for MSS value

HPMN customized code for TAP IN parsing and RAP OUT formation will be updated to support Tap 3.12 32.4 as well.

INCS interface will be modified to accommodate the APN attribute as well as the service type.



### ARCM Outcollect

‘Outcollect Summary file (OUTS)’ interface will be modified to accommodate CTL2 and APN attributes.

The OUTS mapping process will be adjusted in ARCM to map the service type, CTL2 and APN attributes as received in the Dispatcher (DISP) file from APRM. If the profile is not 32.4 than CTL2 value will not be mapped.

ARCM will produce Mobile Session Service (**MSS)** events in TAP3.12 format for an emergency calls (E911) over LTE, identifying those by value “W” of the Service Type attribute of DISP interface from APRM

VPMN customized code for TAP OUT formation and RAP IN parsing will be updated to support Tap 3.12 32.4 as well.

Amdocs will provide Inbound LTE roaming records in TAP3.12 format for further verification and testing with DCH.

### Internal Interfaces

Following changes are done in the interfaces between ARCM and APRM, added to allow implementation of USCC requirements for this release

* DISP – valid values added ‘L’ and ‘W’ are added for Service Type attribute
* INCS – APN attribute is added
* OUTS – APN and CTL2 is added

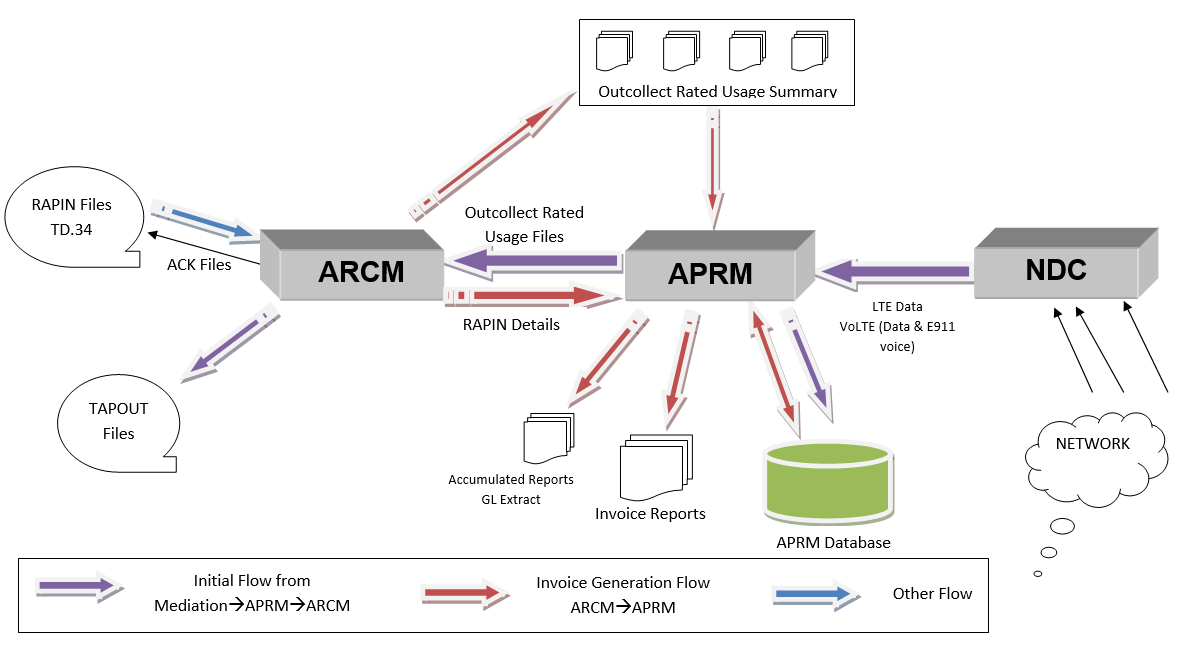
Note *The OOB ARCM-APRM interfaces are not final and contain minimum required attributes. It can be extended to address specific customer requirements (f.e. as it is described in this chapter)*

## APRM

### Outcollect Solution Overview

* APRM LTE Data roaming solution will be enhanced to support new services (products) for VoLTE
* These new services will be actually data events with different types of QCI/APN values and different rating schemas for them along with voice event for E911 calls
* The data events are sent in the TAPOUT file created by ARCM as GPRCall Events and will have the CallTypeLevel2 field populated with the QCI (as sent by NDC🡪APRM🡪ARCM)
* The E911 events are sent in the TAPOUT file as MSS (Mobile session service) events
* The APRM GL Sap extract for Outcollect LTE Data will contain also the new VoLTE feed
* GL codes for the new services will be provided be USCC

Outcollect Diagram:



* Invoicing process will not change as CDR level information is not present on the invoice (breakdown is at TAP file name).
* RAPOUT process will not change.
* Invalid values of QCI or APN will cause the CDR to be reported to APRM error repository. Error management/handling will follow existing procedure.

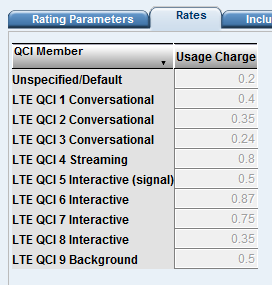
### Outcollect Solution Details

* The existing field NDC🡪APRM (OUTD) interface structure will not change. Valid values inside the fields will change as follows (this information will also be present in the external NDC🡪APRM IDD)

|  |  |  |  |
| --- | --- | --- | --- |
| **Service** | **Field Name** | **Values** | **Comment** |
| LTE Data | Service Type | H | Already existing in the system |
| VoLTE Data (regular) | Service Type | L | New value to identify VoLTE Data (not coming from E911 calls) |
| VoLTE Data (emergency) | Service Type | S | New value to identify VoLTE Data (coming from E911 calls) |
| E911 Voice | Service Type | W | To identify VoLTE calls duration based – on seconds (E911) |
| Dialed Number | 911 | To identify special call (emergency). “911” can be configurable and multiple values considered as special numbers |
| Normalized Called Number | 911 | Same comment as for DIALLED\_NUMBER |
| Call Direction | O | Identify outgoing call |
| Charging Parameter for Voice | 123 | Number of seconds. 123 is just an example. For this type of call (service type) the  Charging Parameter for GPRS  will be empty |
| UOM | SS | Unit of measurement. Should be “SS”. For Data events it’s “By” |

* For the E911 voice call, both fields “Dialed Number” and “Normalized Called Number” from the NDC🡪APRM interface will be populated by NDC with hardcoded string “911”
* For all the new services, the QCI value will be passed in “CallTypeLevel2” field. It is expected that the value will be a valid one from the TAP standard (values 20 to 29)
* The E911 Voice events based on number of seconds will be zero-rated
* The new services (products) will be created in APRM (GUI). The product/event identification solution will not change, only new table entries will be added in the product mapping table (to point the new values from the Service\_Type field to the new products)
  + Equivalent products will be created for CD (Charge Data) and TD (Test Data)
  + Only the CD events will be part of invoicing and SAP GL Extract
* The new VoLTE products will be attached in the partner-agreements and new rate plans will be defined for each product
* The rate plans attached to these new services will have capability to define a different rate for distinct QCI values and/or for distinct APN values
  + The APN value considered for distinct rating will be the APN-NI (existing already in the NDC🡪APRM OUTD interface)
  + The distinct values/grouping of APNs will be provided by USCC
  + The QCI value used will be from the existing CTL2 field from the NDC🡪APRM interface

Sample values below for rating based on QCI (the names of the QCI and APN members are configurable and not hardcoded):



* The rating currency will be USD
* In case also rating based on Serving BID is required (which was developed in R3 LTE Roaming), all BIDs information needs to be defined in APRM reference tables:
  + Currently there are around 160 distinct BID values in APRM grouped in 4 distinct sets

|  |  |
| --- | --- |
| BIDC | Central Region |
| BIDE | East Region |
| BIDW | West Region |
| BIDM | Midwest Region |

* + All new BIDs added by USCC should also be defined in APRM and mapped to a set
  + If rating based on Serving BID is not required, it’s not mandatory to have updated BID information in APRM
* The roaming partner/agreement and rate information will be gathered during the BPT process. This reference BPT information will be uploaded in the system by Amdocs and delivered as part of this project (provided the information will be received within the give and get timelines). The BPT process is under Amdocs responsability
* APRM Dispatcher process which sends rated CDRs to ARCM will not require any changes as it uses the Outcollect table and this table will have the CTL2/APN already populated
* The ServiceType field in the APRM🡪ARCM feed will be sent by APRM as coming in from NDC. ARCM will use this to identify the different events: GPRS calls (for the data events) and MSS for the E911 voice
* ARCM will create TAPOUT files based on the Dispatcher feed received from APRM. All LTE\_Data, VoLTE Data and E911 MSS events will go in the TAPOUT file
* ARCM will send back to APRM the Outcollect Summary file. The Service\_Type field in this interface will be as sent originally by APRM
* The Outcollect Summary interface (which is internal) will be changed to accommodate the CTL2 and APN values

### Outcollect SAP Extract

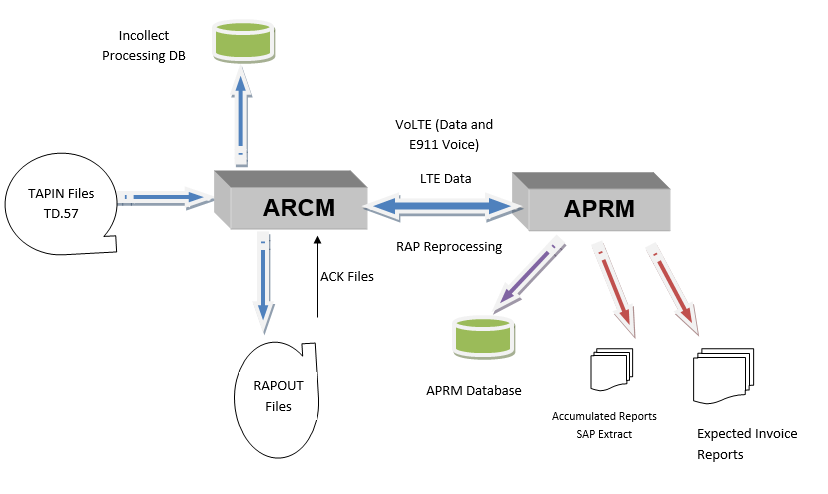
* Currently the Outcollect LTE Data SAP Extract is generated on 4th of the calendar month. This process will not change
* The existing LTE Data SAP extract for Outcollect will contain now also the Outcollect VoLTE feed
* GL codes for the new services will be provided by USCC (it will not be possible to setup distinct GL Codes per QCI)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Service** | **CRDR\_IND** | **GL Code** | **Cost\_Center** | **Product** | **Tax\_Code** | **Tax\_Jur\_Cd** |
| TAP Outcollect VoLTE Data (regular) | CR |  |  |  |  |  |
| TAP Outcollect VoLTE Data (regular) | DR |  |  |  |  |  |
| TAP Outcollect VoLTE Data (emergency) | CR |  |  |  |  |  |
| TAP Outcollect VoLTE Data (emergency) | DR |  |  |  |  |  |
| TAP Outcollect E911 Voice | CR |  |  |  |  |  |
| TAP Outcollect E911 Voice | DR |  |  |  |  |  |
| RAP Outcollect VoLTE Data (regular) | CR |  |  |  |  |  |
| RAP Outcollect VoLTE Data (regular) | DR |  |  |  |  |  |
| RAP Outcollect VoLTE Data (emergency) | CR |  |  |  |  |  |
| RAP Outcollect VoLTE Data (emergency) | DR |  |  |  |  |  |
| RAP Outcollect E911 Voice | CR |  |  |  |  |  |
| RAP Outcollect E911 Voice | DR |  |  |  |  |  |

### Incollect Solution Overview

* APRM LTE Data roaming solution will be enhanced to support new services for VoLTE: VoLTE Data and VoLTE E911 MSS events
* For Incollect, the records are already rated and they will only be accumulated in APRM
* The QCI and APN values will be received in the TAPIN file and passed from ARCM to APRM for reporting purposes
* The descriptions of the QCI and APN values will be configured in APRM GUI (role based access in Configurator module)
* RAPOUT process will not change
* Invalid values of QCI or APN will cause the CDR to be reported to APRM error repository. Error management/handling will follow existing procedure.
* Invoicing process will not change as CDR level information is not present on the invoice (breakdown is at TAP file name)

Incollect diagram



### Incollect Solution Details

* APRM LTE Data roaming solution will be enhanced to support new services: Incollect VoLTE Data and Incollect VoLTE E911
* The QCI values for the CDRs will be passed from ARCM to APRM in CTL2 field for reporting purposes
* The internal interface ARCM🡪APRM Incollect summary will be enhanced to support new service types for the new events
* The internal interface ARCM🡪APRM Incollect summary will be enhanced to contain also the APN value (APN-NI)
* The new services (products) will be created in APRM (GUI). The product/event identification solution will not change, only new table entries will be added in the product mapping table (to point the new values from the Service\_Type field to the new products)
  + Equivalent products will be created for CD (Charge Data) and TD (Test Data)
  + Only the CD events will be part of invoicing and SAP GL Extract
* The new VoLTE products will be attached in the partner-agreements and new rate plans will be defined for each product
* The rate plans attached to these new services (Incollect) will not be rating but guiding as the records are already charged in the TAPIN. The charges will be accumulated in APRM accumulated usage tables
* The currency for the accumulation will be USD
* The roaming partner/agreement and rate information will be gathered during the BPT process. This reference BPT information will be uploaded in the system by Amdocs and delivered as part of this project (provided the information will be received within the give and get timelines). The BPT process is under Amdocs responsibility

### Incollect SAP Extract

* Currently the Incollect LTE Data SAP Extract is generated on 4th of the calendar month. This process will not change
* The existing LTE Data SAP extract for Incollect will contain now also the Incollect VoLTE feed
* GL codes for the new services will be provided by USCC (it will not be possible to setup distinct GL Codes per QCI)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Service** | **CRDR\_IND** | **GL Code** | **Cost\_Center** | **Product** | **Tax\_Code** | **Tax\_Jur\_Cd** |
| TAP Incollect VoLTE Data | CR |  |  |  |  |  |
| TAP Incollect VoLTE Data | DR |  |  |  |  |  |
| TAP Incollect E911 Voice (MSS) | CR |  |  |  |  |  |
| TAP Incollect E911 Voice (MSS) | DR |  |  |  |  |  |

# Customer Software and Third-Party Software

## Integration with External Systems

| External Interface Name | Description | 3rd Party System | Provider | Consumer |
| --- | --- | --- | --- | --- |
| OUTD | Outcollect Unrated Data – addition of valid values | NDC (Mediation) | NDC | APRM |
| SAP | SAP GL extract will contain also VoLTE CDRs | SAP | APRM | SAP |
|  |  |  |  |  |

## Impact on National Retailer Integration – N/A

# Data Model Changes – N/A

## Reference Changes

A new reference table to help identify VoLTE calls based on APN and/or CallTypeLevel2 will be added, the table describes the relationship between the partner and the relevant APNs used for VoLTE as well as indicates if CallTypeLevel2 marking for VoLTE is used or not.

During mapping of INCOLLECT events to APRM output, ARCM will query the table in order to understand if the GPRS call is actually a VoLTE call or not.

Table 1: SMM9\_BEARER\_MAP

| Column name | Type | PK | example |
| --- | --- | --- | --- |
| TADIG\_CODE | VARCHAR2 | Y | USACG |
| BEARER\_TYPE | VARCHAR2 | Y | A (apn) , C (callType2) |
| EFFECTIVE\_DATE | DATE | Y |  |
| Control fields |  |  | Operator ID, app ID etc. |
| EXPIRATION\_DATE | DATE |  |  |
| BEARER\_VALUE | VARCHAR2 |  | 4G.uscc.com  Video.uscc.com|voice4G.uscc.com  22|23|24|25|26|27|28|29  Multiple values are separated by a pipe |
| BEARER\_SERVICE | VARCHAR1 |  | W – VoLTE  Single letter , mapped directly to APRM service |
| DESCRIPTION | VARCHAR2 |  | Cingular VoLTE over GPRS |

# Suggested Implementation Actions

## Implementation Changes

### EPC

N/A

### BPT

|  |  |  |
| --- | --- | --- |
| Application | Yes / No | Description of Impact |
| ARCM BPT | Yes | Reference table should contain information about type of identification (APN or QCI) per PLMN and its own values for identification of relevant LTE services |
| CRM BPT | No |  |
| OMS BPT | No |  |
| Billing BPT | Yes | Update the following tables with the new SID values:  PC9\_SID , PC9\_SID\_LIST, PC9\_SERVE\_AREA\_TO\_SID, PC9\_INCOL\_SID\_PAIR, MF1\_OUTCOL\_SID\_PAIR |
| MT BPT | No |  |
| Letters | No |  |

### JGL

N/A

### User Role Changes

|  |  |  |
| --- | --- | --- |
| Front Line System | Yes / No | Description of Impact |
| CIM | No |  |
| RIM | No |  |
| RIM Lite (RIM for Agents) | No |  |
| MT | No |  |

# Operational Concept

## Operational / SLA Impact

| Impacted Area | Impact Description |
| --- | --- |
| Stuck Order | No |
| Billing EOD | No |
| Tables Clean Up | No |
| TRB | No |
| BT Performance | No |
| BT Success Rate | No |
|  |  |

## Dormant Functionality (On/Off Flag)

N/A

## Impacted Components

The following table lists the applications and areas that will have an operational impact:

|  | New Process (Job, Daemon, and so on) | Data Model Change in Application Tables (New Tables or Columns in Existing Tables) | Increase of Volume on an Existing Table | Addition to Bill Format (New Section, Line Item, and so on) | New Output File (Even if Intermediate) | Existing Output Files with New Data Elements or Increased Volume | New Input Files from USCC or Third-party due to New Functionality | New APIs | Changes/Additions to API/WS/Tuxedo/TRB due to New Functionality and Additional Volume | Screen Changes |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| APRM | No | No | PRM\_ROM\_OUTCOL\_EVENTS  PRM\_ROM\_OUTCOL\_EXT\_DATAKEY  PRM\_ROM\_INCOL\_EVENTS | No | SAP extract Inbound and Outbound will contains also VoLTE data (it’s not a new file) | No | OUTD files from NDC will contain new values for the VoLTE events | No | No | No |
| ARCM | No | No | ARCM tables - Volume driven | No | Yes – new TAP version | No | Yes – new TAP version | No | No | No |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
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# Impact on Infrastructure

## Changes and Upgrades

Projected volumes:

|  |  |  |
| --- | --- | --- |
| **Element/Source** | **Included in Phase 2?** | **Records/Day**  **(VoLTE Roaming Impact)** |
| **PGW**  (Voice + Data) | Yes | 800,000 |
| **TAS**  (VoLTE Voice) | Yes | 800,000 |
| **TAP IN**  (LTE + VoLTE) | Yes | 800,000 |
| **TAP OUT**  (LTE + VoLTE) | Yes | 500,000 |
| **CIBER IN** | Yes | -800,000 |
| **CIBER OUT** | Yes | No Change |

There is no hardware impact other than storage identified due to the above projected volumes.

Sizing set up as per R3 LTE Data:

|  |  |
| --- | --- |
| InCollect Daily Number of Events | 8,900,000 |
| OutCollect Daily Number of Events | 4,300,000 |

Approximated current volumes in production:

|  |  |
| --- | --- |
| InCollect Daily Number of Events | ~2,400,000 |
| OutCollect Daily Number of Events | ~500,000 |

### Hardware – N/A

#### Processing

N/A

#### Storage

Suggested TACT additional capacity requirement:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Prod | | | | | |
|  | DB | DB Area | Flat File | DB History | Total: |
| Amdocs Partner Settlement Manager | 845 | 222 | 312 | 0 | 1,379 |
| Event Server | 54 | 18 | 0 | 137 | 209 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PET | | | | | |
|  | DB | DB Area | Flat File | DB History | Total: |
| Amdocs Partner Settlement Manager | 845 | 222 | 78 | 0 | 1,145 |
| Event Server | 54 | 18 | 0 | 23 | 95 |

### Software

#### Licenses

## Third Party

### Hardware

### Software

# Upgrade of Production Data –

## Existing Customers Impact

N/A

## Wholesale impact

* For existing partners joining VoLTE agreement, there is a low possibility of having duplicates events coming into the system and not being identified as such due to change in the TD57 duplicate check rules for GPRS calls
* Such duplicates will lead to USCC being charged twice by the roaming partner
* This risk will only be applicable while the retention period of the Duplicate Check functionality is not passed

## Adding VoLTE services to an existing partner agreement (ARCM and APRM)

ARCM steps:

* The existing pair for the roaming partner should be modified to support the VoLTE service (in ARCM console)
* The Profile should be saved, approved and deployed in order for the changes to be effective (active) in production
  + Make sure the effective date of the processing profile is proper: events arriving in the system should not have a datetime stamp prior to the effective date of the profile
* The processing flow of both TAPIN and TAPOUT will not be impacted by the VoLTE change. The current LTE Data files should be processed successfully as per today

APRM steps:

* Rate plan should be created for the Outcollect products with the specific rate for the partner for the VoLTE products
  + Incollect products have a generic guiding rate plan (no rating is performed in Incollect flow)
* In APRM Online GUI (main module), the agreement of the partner should be opened in “Edit” mode
* By using the “Handle products” button, the VoLTE products should be included in the agreement
* Rate plans (which are created prior) should be attached to the VoLTE products added in the agreement
* An effective date needs to be selected (the date when the agreement with the partner for VoLTE services is beginning)
* Agreement should be Saved

Note that the changes performed in APRM GUI are valid for event processing only after the EOD MAP when the Release job is ran – basically, next day.

# Test Guidelines

## Business Testing

### APRM

Outbound Roaming

1. Place INCS file containing VoLTE events in APRM input directory

Expected results: INCS file should be picked up and processed by APRM. Charges should be present in APRM usage tables

1. Run Invoicing and SAP Extract for Incollect (on 4th of the calendar month)

Expected results: Invoice and SAP extract should be generated at specific locations. Invoice can also be viewed from APRM GUI. SAP extract should have the correct GL codes for the new VoLTE services

Inbound Roaming

1) Place OUTD file (from NDC) containing VoLTE events in APRM input directory

Expected results: OUTD file should be picked up and processed by APRM. Charges should be present in APRM usage tables. Charges should match correctly against the rates setup for the specific events and the volume (charging parameter)

1. Run Invoicing and SAP Extract for Outcollect (on 4th of the calendar month)

Expected results: Invoice and SAP extract should be generated at specific locations. Invoice can also be viewed from APRM GUI. SAP extract should have the correct GL codes for the new VoLTE services

### ARCM

Outbound Roaming   
1) Place a TAP IN file, with the bellow events, in the HPMN input directory:

* GPRS event with CTL2 attribute between 20-29
* MS event with MSS attribute ‘3’
* APN with value as given in SMM9\_ARCM\_MAPPING

Expected result: File should be collected and processed. Both events should be recognized as VoLTE event and mapped correctly into INCS.

2) Place a TAP IN file, with the bellow events, in the HPMN input directory:

* GPRS event with CTL2 attribute smaller than 20

Expected result: the event is identified as GPRS over LTE event and mapped accordingly into INCS.

D:\TEMPLATE\Note.gif If APN matches VoLTE than even will be mapped VoLTE

3) Place a TAP IN file, with the bellow events, in the HPMN input directory:

* MS event with MSS attribute ‘2’

Expected result: the event is rejected by ARCM and a matching RAP OUT file is created for NDC in predefined location.

4) Place a TAP IN file, with the bellow event types, in the HPMN input directory:

* GPRS event with APN value from the new APN reference table (which identifies a VoLTE call)

Expected result: File should be collected and processed. Events should be recognized as VoLTE event and mapped correctly into INCS.

.  
Inbound Roaming   
Place an Inbound roaming CDRs (DISP) file in the VPMN input directory with GPRS and VoLTE events:

A TAP out file is created for NDC in predefined location and an Outcollect summary (OUTS) file is created for APRM in matching predefined location.

### Regression Scenarios

#### VoLTE Roaming – Basic E2E flow

* 1. Create new Customer via CIM under VoLTE market coverage***.***
  2. Provide postpaid offer - 1 Subscriber with Volte capable device and allowance – Verify AAM provisioning.
  3. Set Bill format as Paper - Mabel
  4. Run VoLTE Roaming events with all kind of features like: Emergency (911), International, etc. – Verify the events will be rated/dropped based on the number used.
  5. UQ – Verify all Events and allowance usage appear correctly - Play with the Search’s and filters and verify all is working correctly and shown the expected results.
  6. Run EOC –
     1. Verify GBF file was loaded and eBill DB is updated correctly
     2. Verify reconciliation processes
     3. Verify PDF/XML/Mable are correct and the Volte roaming charges display in the correct section.
  7. Bill Image – Verify the PDF is correct
  8. UQ after EOC – Verify all Events and allowance usage appear correctly
  9. Run AR1INVRCT – Verify all charges including the VoLTE created in ar1\_charges
  10. Perform AR activities on the Volte charge such as credit and credit reversal
  11. Run GL – Verify AR1\_GL\_DETAILED\_DATA\_INFO\_V populated with new Data (Usage and RC) related to VoLTE roaming

#### VoLTE Roaming – Throttling

* 1. Create new Customer via CIM - Make sure to set address that is under VoLTE market coverage***.***
  2. Provide postpaid offer - Subscriber with Volte capable device and allowance
     1. Verify all Throttled BO and attributes exist BAU
     2. Add data Roaming throttling offer
     3. Complete the Provide - Verify AAM provisioning.
  3. EP – Run Volte Roaming events to reach the Roaming throttling limit
     1. Verify Event Rated Successfully.
     2. Check CM1\_FUTURE\_REQUEST and CM1\_AGREEMENT\_PARAM tables.
     3. Verify notification was sent for the throttling
     4. OMS – Check CP change order was complete successfully – Verify the throttled attribute update
  4. Promote LD to EOC date
  5. Run EOD – Verify the Unthrottling:
     1. OMS - Validate CP Change Order was complete successfully - Verify the throttled attribute update
     2. Check CM1\_FUTURE\_REQUEST and CM1\_AGREEMENT\_PARAM table for the unthrottling.
     3. Verify AAM was updated for the unthrottling
  6. Run EOC –
     1. Verify GBF file was loaded and eBill DB is updated correctly
     2. Verify reconciliation processes
     3. Verify PDF/XML/Mable are correct and the Volte roaming charges display in the correct section.
  7. Run more Volte roaming events and verify they are not charge.

#### More Testing:

1. Perform testing from CIM and RIM and RIML
2. Run Volte roaming events for subscriber and account level – Verify charges on bill
3. Run GL for Unbilled Volte Roaming charges
4. Multi subscription customer:
   1. With Volte/Non Volte capable subscribers – Run regular and Volte roaming events.
   2. With/Without Allowance – Run Volte events for both cases.
5. Perform change ownership for subscriber that is Volte capable – verify new subscriber is also Volte capable – run events and verify they rate correctly.
6. Bill Layout
   1. Verify PDF after 2 EOCs
   2. Verify PDF of multi subscription customer - CTN Summary of Totals will be added in case of more than 1 subscriber with roaming charges for each CTN per it's usage.
7. Negative –
   1. Recycle event in AEM –
      1. Run Volte roaming events with details that will cause the event to be rejected (reject that can be handle in AEM like: Carrier ID does not exist)
      2. Fix the problem and recycle the event in AEM – verify it get completed successfully and rated.
   2. Run event on suspend subscriber – Event will be rejected
      1. Resume and rerun the event – Event should be rated
   3. Create customer with address that is **not under VoLTE market coverage** – make sure the ‘Is Volte Enabled’ attribute will not be updated to ‘Y’ when selecting Volte device.
8. Allowance testing:
   1. Verify messages display when consuming allowance in amount define in thresholds like: Overage message when consuming all allowance.
   2. Perform Volte roaming calls that consume from allowance and then remove the allowance BO in the middle of the cycle instance – verify :

* The Volte calls are mark for rerate - Run Rerate
* Verify after next EOC – no new PI is opened

1. Throttling Testing:
   1. Volte roaming event that reach 75% of the limit – Verify notification
   2. Customer with family offer with 2 subscribers - One subscriber with throttling offer and other subscriber without – Run Volte roaming events for both subscribers to reach the limit
   3. Throttle of Total and Roaming together of Volte events, and removal of it at EOC.
   4. Volte Roaming event that consume the exact volume of the throttling limit – Verify throttling
   5. Suspend subscriber that has future request for Unthrottling in CM. run EOC – The Unthrottling will be processed successfully.
   6. Cease subscriber that has future request for Unthrottling in CM – Verify the Unthrottling future request will be removed by CM.
   7. Reestablish throttled subscriber– Verify an automatic un throttling is perform by EPC rules.
   8. Replace offer for throttled subscriber:
      1. New offer with a lower value of threshold - the subscriber will not be un-throttled automatically. It will be M&P for the user NOT to perform a manual un-throttling process – Run EOC and verify it will be un throttled BAU
      2. New offer with a higher value of threshold - the subscriber will not be un-throttled automatically. It will be M&P for the user to perform a manual un-throttling process.
   9. Change ownership for throttled subscriber - CM will create new subscriber, throttle indication will be No - Future request for un throttling will be update with status ‘D’
   10. Manual UN throttling – Perform Change OA to manual Unthrottl a subscriber.
2. Replace device  -

a.       From Volte capable device to Non Volte Capable device – The ‘Is Volte Enabled’ will be set to ‘No’ by EPC Rule when clicking ‘Validate’.

b.      From Non Volte capable device to Volte Capable device – The ‘Is Volte Enabled’ will be set to ‘Yes’ by EPC Rule when clicking ‘Validate’.

1. Reestablish – Cease subscriber with non-Volte capable device

Reestablish – replace device to Volte capable – Verify the ‘Is Volte Enabled’ will be set to ‘Yes’ by EPC Rule

1. Inflight Order
   1. R9 –
      1. Login with non-Volte Role
      2. Start provide and add Volte capable device – ‘Is Volte Enabled’ = No as the user is not authorized
      3. Save the order on NPC and close the order.
   2. Upgrade env to R11
   3. Login with non-volte role
   4. Resume order – click Validate on NPC – The ‘Is Volte’ Enabled’ attr will be set to ‘Yes’ By EPC Rules.

## Operational Testing

### Performance Testing

It is recommended to do performance testing for the new VoLTE feed.

# Risks

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Risk | Impact Type | Impact Severity | Mitigation/Solution | Owner | Status | Due Date | Comments |
| R.01 | Duplicate events may pass ARCM towards APRM | Wholesale settlement | Low | N/A | USCC | New |  |  |

# Open Issues

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| # | Open Item | Impact | Type of Open Item | Owner | Status | Due Date | Comments |
| 1 | *The OI  is related to E911 implementation in USCC. According to TAP3.12 standard (TD57 document) the E911 calls over LTE should come on Mobile Session Service event with usage type 3 (E911 call). Since this is the only possible type of MSS event in this release of USCC – how shall we treat any other usage types (Values 1 & 2)* | HPMN implementation | Error Handling | USCC | ~~Open~~  Closed |  | The MSS records with usage types as “1” or “2” (VoLTE MO/MT non-emergency) will be dropped |
| 2 | Infrastructure impact analysis is pending projected sizing information | Infrastructure | Clarification required | USCC | Closed |  |  |
| 3 | Regarding VIOR\_3.1.11.2.3.1  VIOR\_3.1.29.1.1  What value represents each type of bearer? | ARCM + APRM | Clarification required. | USCC | Closed |  | Service QCI TAP CTL2 values: Voice  21 IMS(Signalling) 25 Internet  29 Video 27,29 |
| 4 | Regarding VIOR\_3.1.49  This BR conflicts with original requirement for VoLTE identification basedon Call Type Level 2 QCI values. | ARCM+ APRM | Clarification required. | USCC | Closed |  | Either APN or CTL2 will be used to identify VoLTE per agreement roaming partner |
| 5 | CIM presentation of VoLTE roaming voice usage  and LTE data usage is under verification | CRM + RLC |  | Amdocs | Closed |  |  |

# Appendix A. Error Messages – N/A

# Appendix B. M&P – N/A

Document Release Information

| Soft-ware Version | Editor | Edited Date | Comments | Sent to Site | Approved By | Doc Ver. |
| --- | --- | --- | --- | --- | --- | --- |
| 11 | Adrian Chiritescu | June 29, 2016 | Initial Version | Y | Olga Karlsbrun | 1.0 |
| 11 | Adrian Chiritescu | July 6, 2016 | Changes due to comments from site | Y | Olga Karlsbrun | 1.0 |
| 11 | Tali Grossman | July 6. 2016 | Changes due to comments from site |  |  |  |
| 11 | Alex Livshitz | July 17, 2016 | Changes due to comments from site |  |  |  |
| 11 | Adrian Chiritescu | July 23, 2016 | Added note that APRM BPT process is under Amdocs responsibility |  |  |  |
| 11 | Anat Maoz | August 2016 | Added assumption VoLTE roaming usage will be with the same structure of the VoLTE voice, the Roaming Indicator AVP will have the value ‘Y’ to indicate the roaming event.  And BPT 7.1.2 impact |  |  |  |
| 11 | Olga Karlsbrun | August 25, 2016 | Updated based on the revised RD | Y |  |  |
| 11 | Adrian Chiritescu | August 30, 2016 | BPT impacted tables updated – section 7.1.2  HW sizing – section 9.1 | Y | Olga Karlsbrun |  |
| 11 | Adrian Chiritescu | September 26, 2016 | Added storage requirements in Chapter 9  Added assumption that IR396 will be implemented prior to IR328  Updated ARCM Incollect solution with new reference table lookup per partner | Y | Olga Karlsbrun |  |