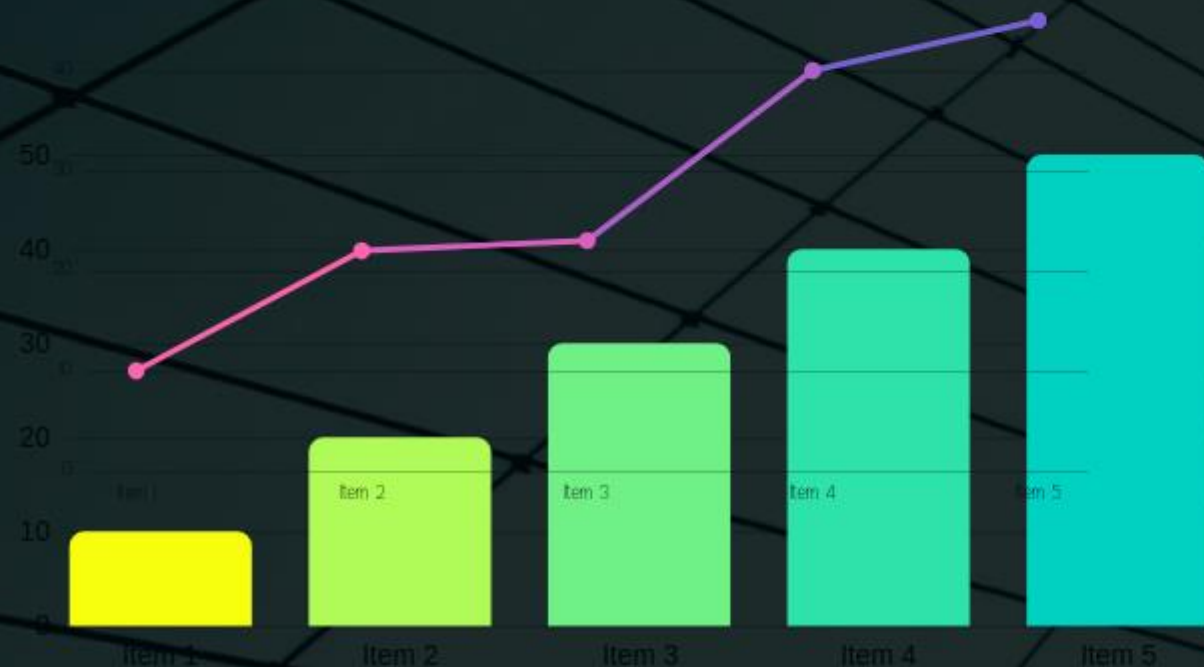


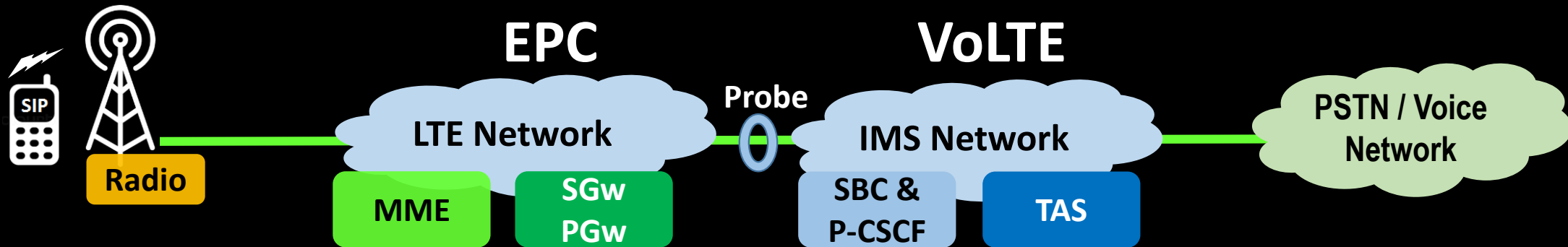
# VOLTE IMS KPI

Key  
performance  
Indicator



# VoLTE KPI – Node Wise

3GPP TS 32.454  
3GPP TS 32.409  
GSMA IR.42

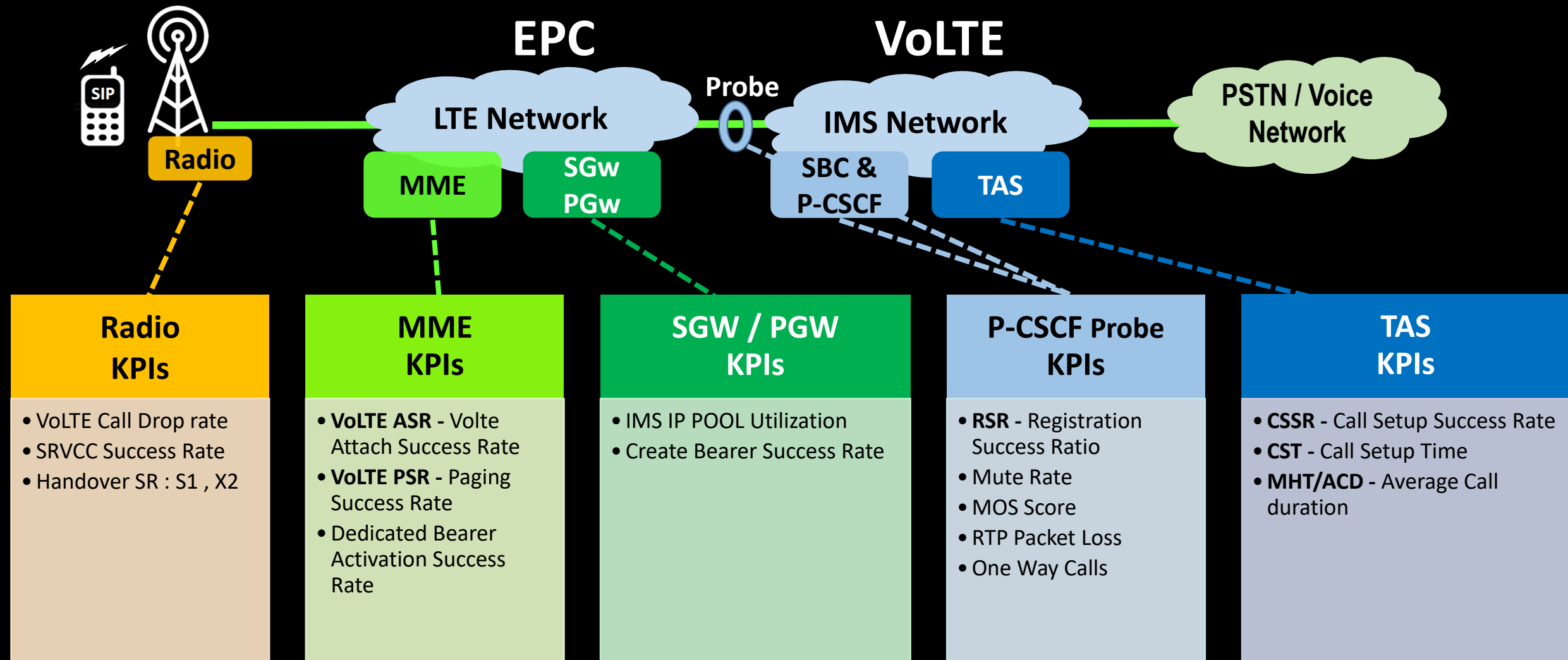


3GPP TS 32.454  
3GPP TS 32.409  
GSMA IR.42

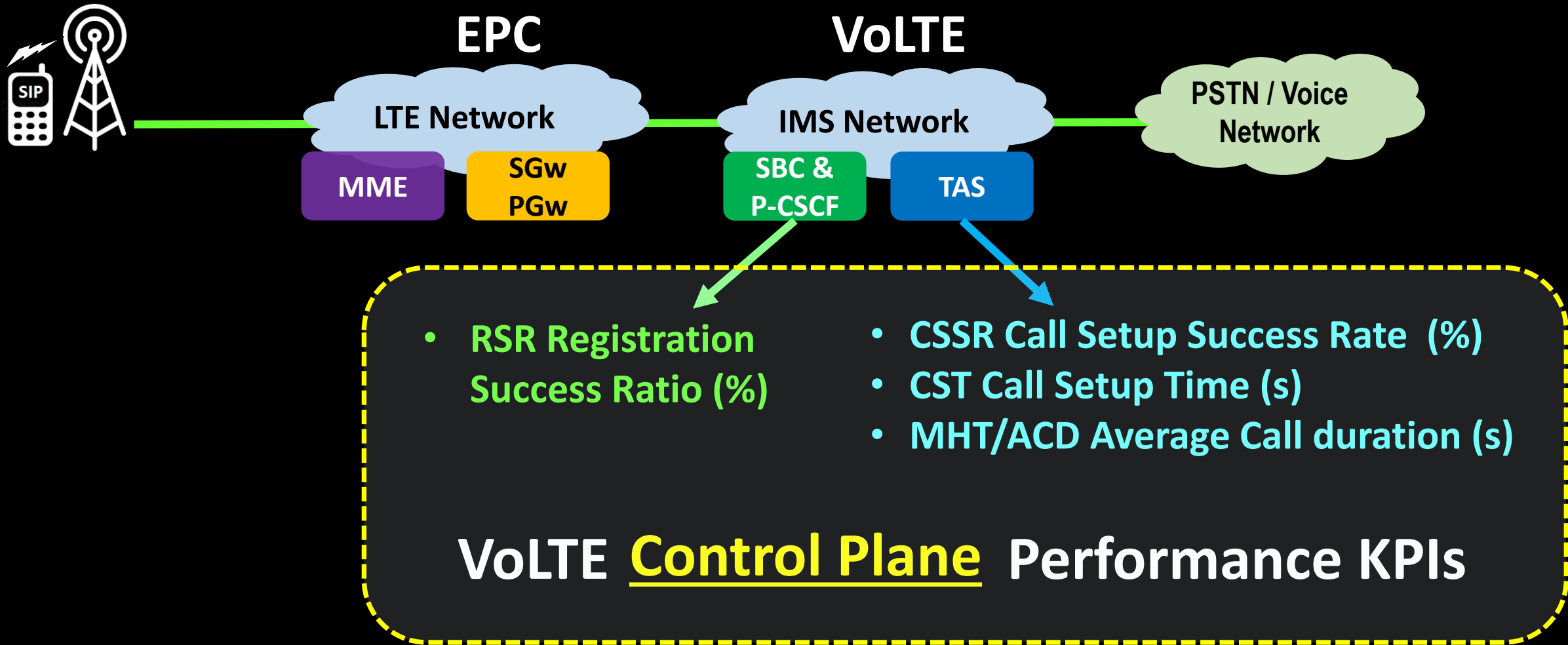


# VoLTE IMS KPIs & Performance indicators

3GPP TS 32.454  
3GPP TS 32.409  
GSMA IR.42



# VoLTE **Control Plane** Performance KPIs



# RSR - VoLTE Registration Success Rate (%)

VoLTE

Control Plane

Performance KPIs

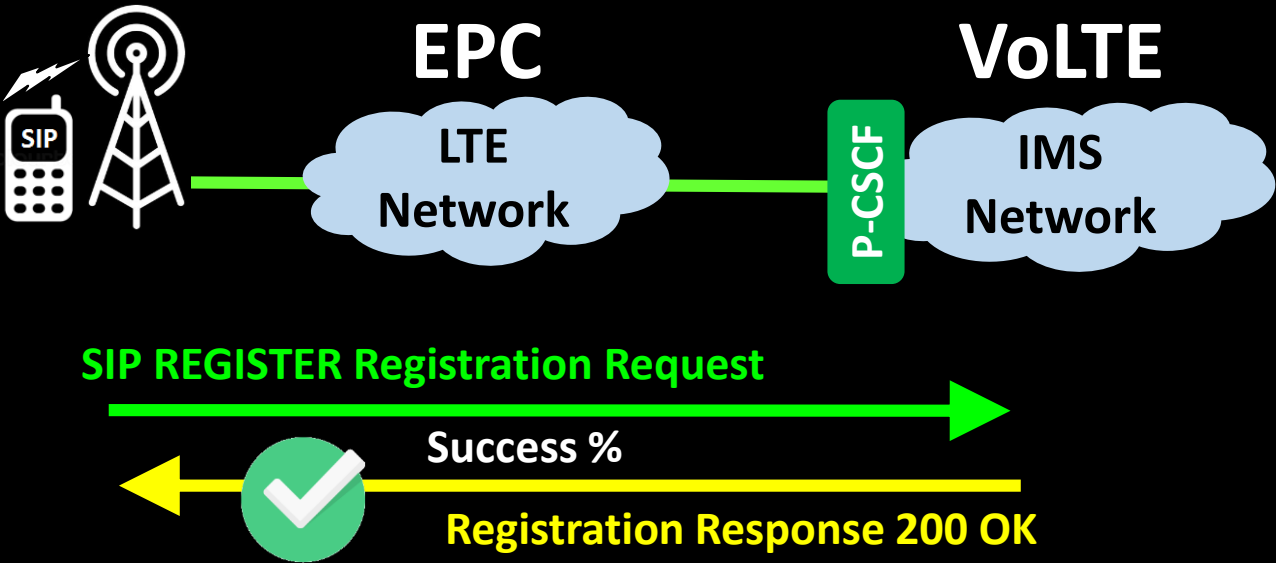
✓

RSR (%) : Registration Success Rate

CSSR (%) : Call Setup Success Rate

CST (s) : Call Setup Time

ACD (s) : Avg Call Dur.



Healthy Range  
**99% +**  
RSR

Category	VoLTE Accessibility Parameters	
Source of Counter	Typically P-CSCF, CSCF can also be used	
Formulae (%)	$\frac{\text{Count of (200 OK) for Registration Completed}}{\text{Count of SIP REGISTER Sent from UE Excluding 401 Error Attempts}} \times 100\%$	
Purpose of Counter	This parameter denotes the probability of UE successfully registering to IMS Network , <b>Impact of KPI</b> : With Low RSR , Customers will not be able to use VoLTE Services	

# CSSR - Call Setup Success Rate - MO , MT (%)

VoLTE

Control Plane

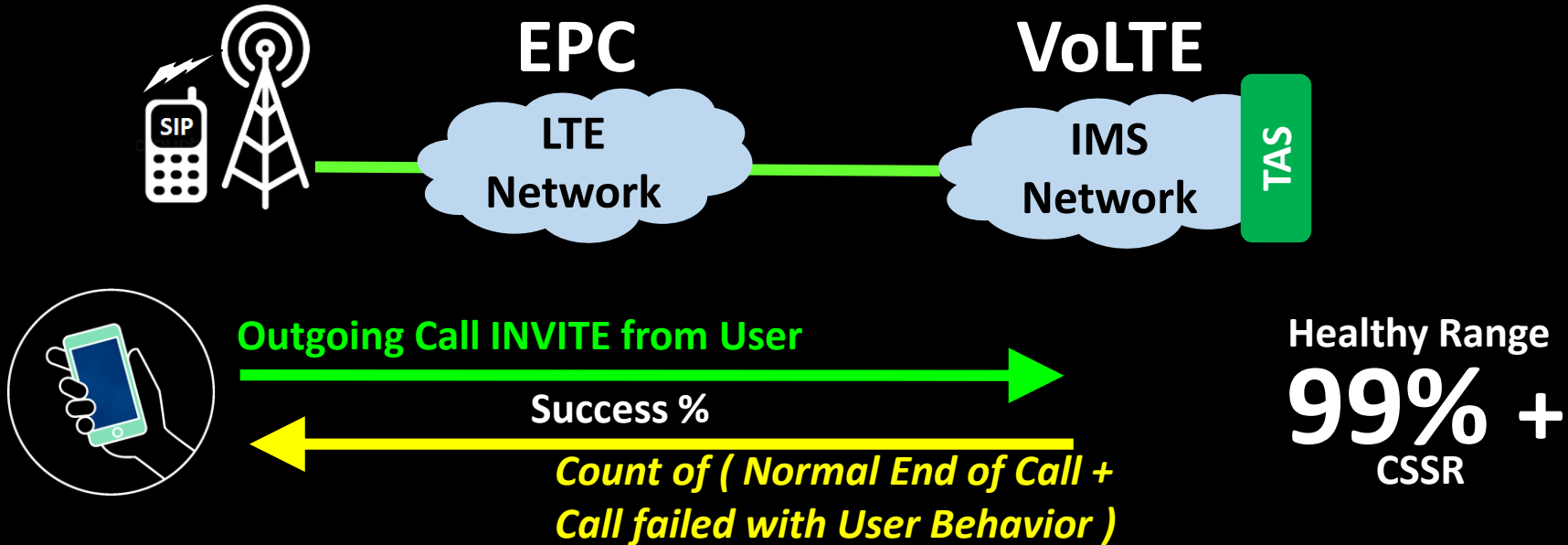
Performance KPIs

RSR (%) : Registration Success Rate

CSSR (%) : Call Setup Success Rate

CST (s) :Call Setup Time

ACD (s) : Avg Call Dur.



Category	VoLTE service integrity and retainability	
Source of Counter	Typically TAS , But CSCF can also be used	
Formulae (%) ( MO Call )	$\frac{\text{Count of ( Normal End of Call + Call failed with User Behavior )}}{\text{Sum of all Call Attempts}} \times 100\%$	
Purpose of Counter	The CSSR indicates the probability of successful calls initiated by the MS , <b>Impact of KPI</b> : With Low CSSR , Customers will not be able to use make or Received VoLTE Calls	

# CST - Call Setup Time (s)

VoLTE

Control Plane

Performance KPIs

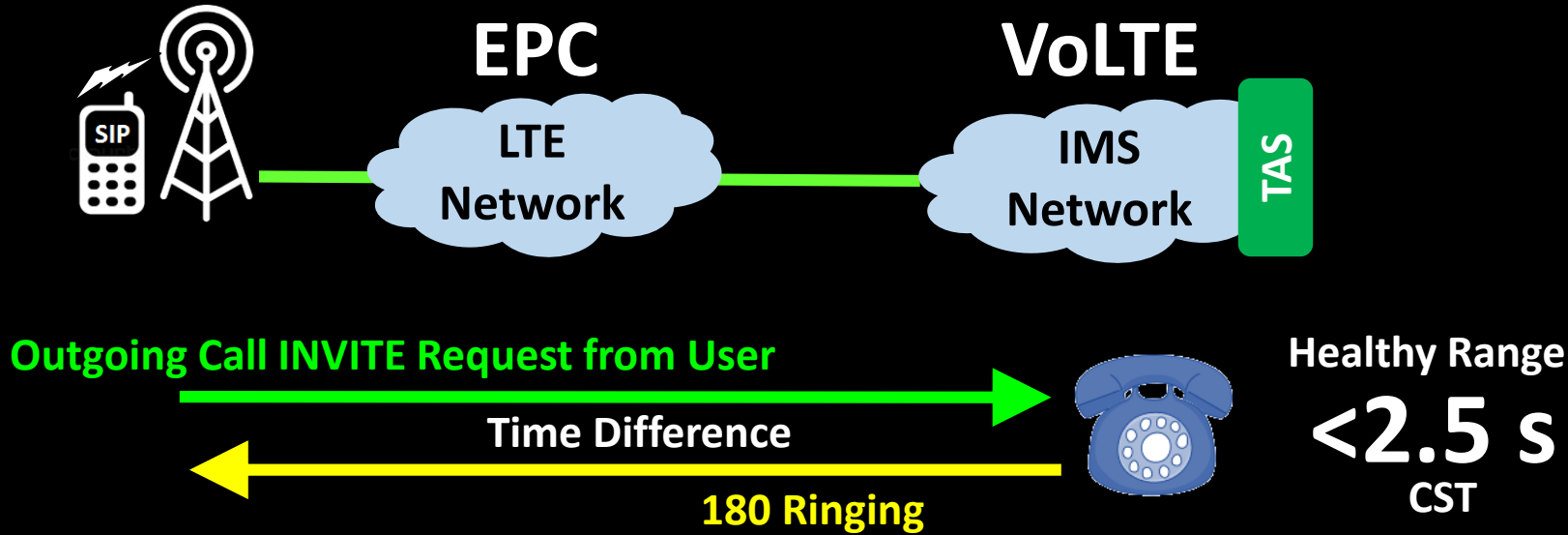
RSR (%) : Registration Success Rate

CSSR (%) : Call Setup Success Rate

✓

CST (s) : Call Setup Time

ACD (s) : Avg Call Dur.



Category	VoLTE service integrity and retainability
Source of Counter	Typically TAS
Formulae ( Sec )	<i>Avg of ( Time(180 Ringing) - Time( SIP INVITE Request ) )</i>
Purpose of Counter	CST is Time between the start of the call and the moment the phone of the called party starts ringing. <b>Impact</b> : High CST will lead to delays & Silence period before Ring, High CST will obviously will deteriorate user experience

# MHT or ACD - Average **Call Duration** (s)

VoLTE

Control Plane

Performance KPIs

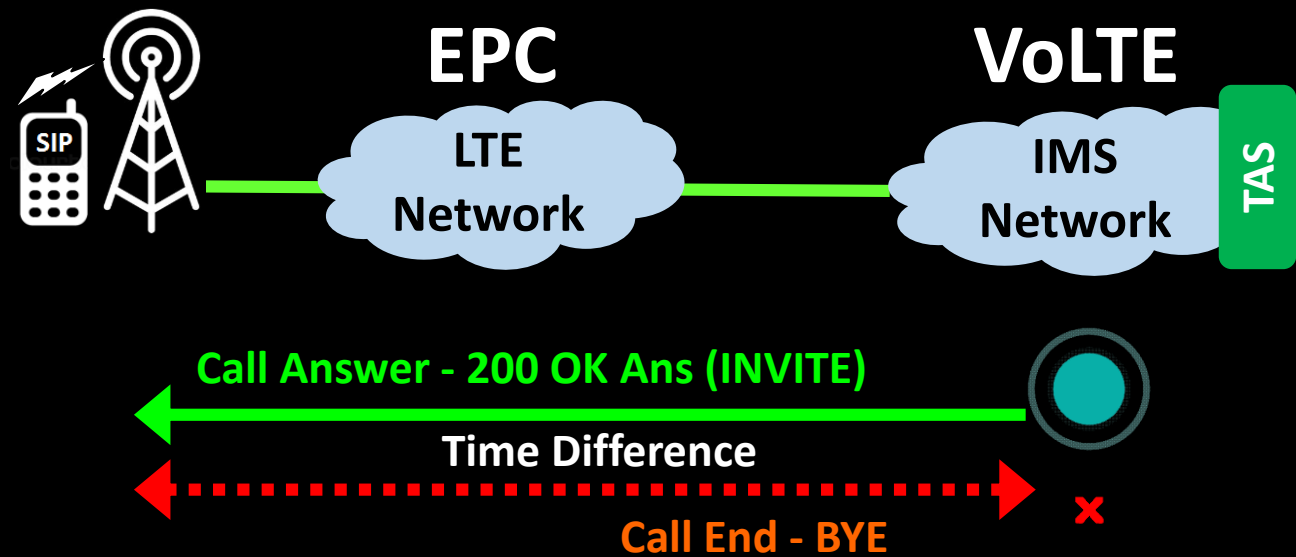
RSR (%) : Registration Success Rate

CSSR (%) : Call Setup Success Rate

CST (s) :Call Setup Time

✓

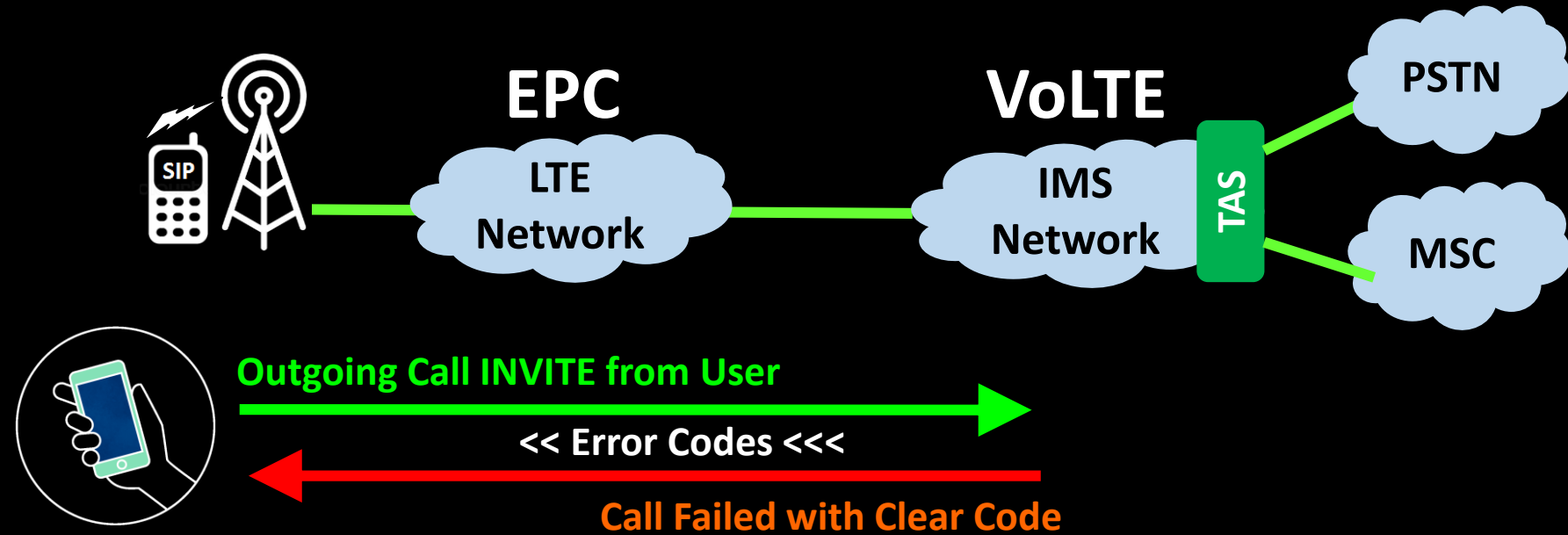
ACD (s) : Avg Call Dur.



Category	VoLTE service integrity and retainability
Source of Counter	TAS
Formulae (Sec)	<i>Avg Call Duration ( Time(BYE) – Time (200 OK Ans INVITE))</i>
Purpose of Counter	ACD is the average length of an answered call made over the network . <b>Impact</b> :- Sudden degradation of ACD Depicts problem in voice path , Either Calls are getting Muted or Getting One Way Audio or May be having Garbled and bad voice Quality



# Clear Code Monitoring in TAS



**Bonus  
Tip**

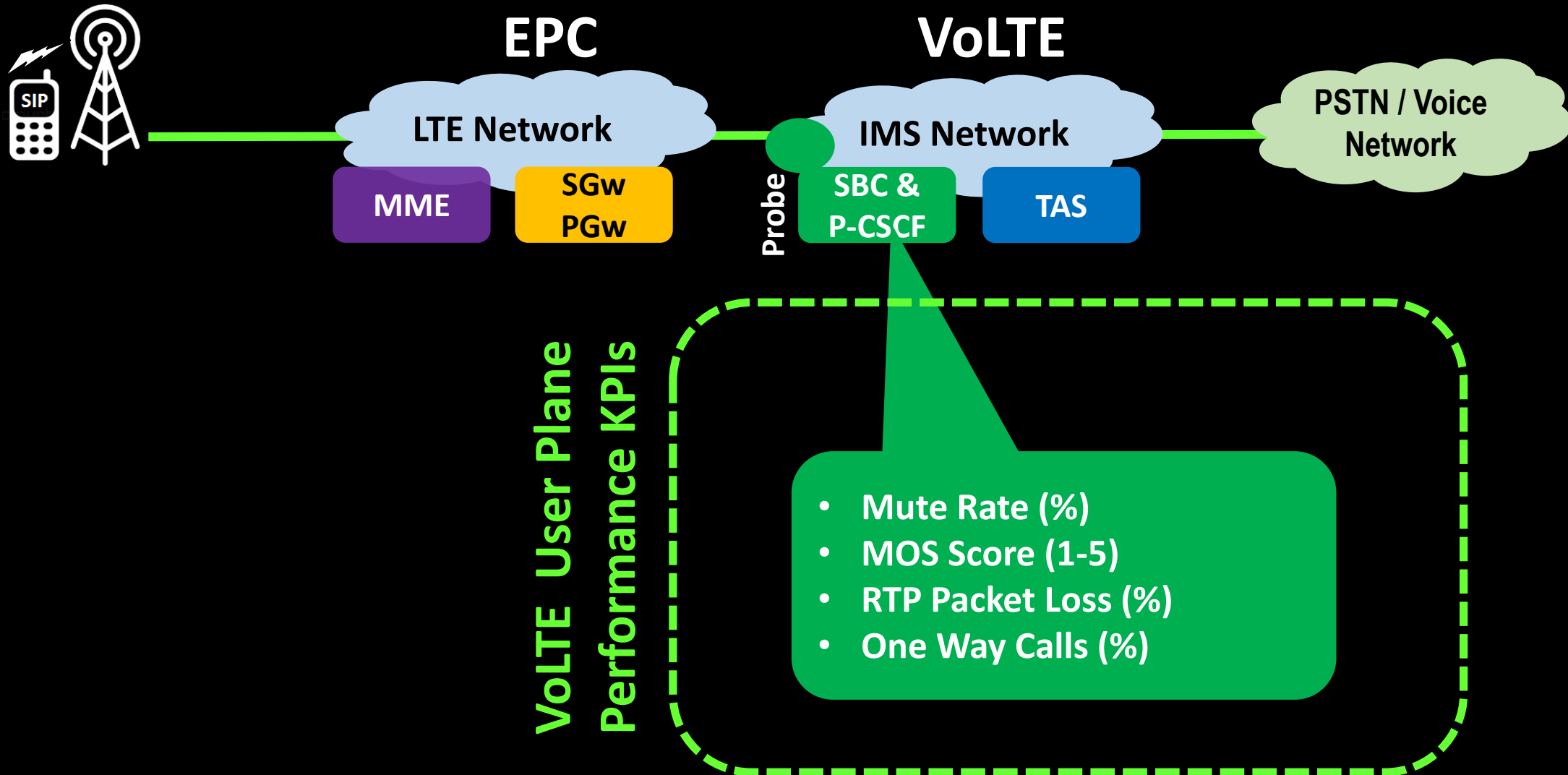
**Clear Code** : Clear Code or End of Selection (EOS) depicts possible reason for failure of call

## **Uses of Clear Codes based Monitoring**

- Complete Check on Outgoing call made by Users
- Detect failures at Early stage
- Detect & Alert Network Outage
- Detect External Failures such as POI Congestion , Failures in Other Operator
- Detect Internal failures as well

# VoLTE User Plane Performance KPIs

3GPP TS 32.454  
3GPP TS 32.409  
GSMA IR.42



# VoLTE Mute Rate (%)

## VoLTE User Plane Performance KPIs

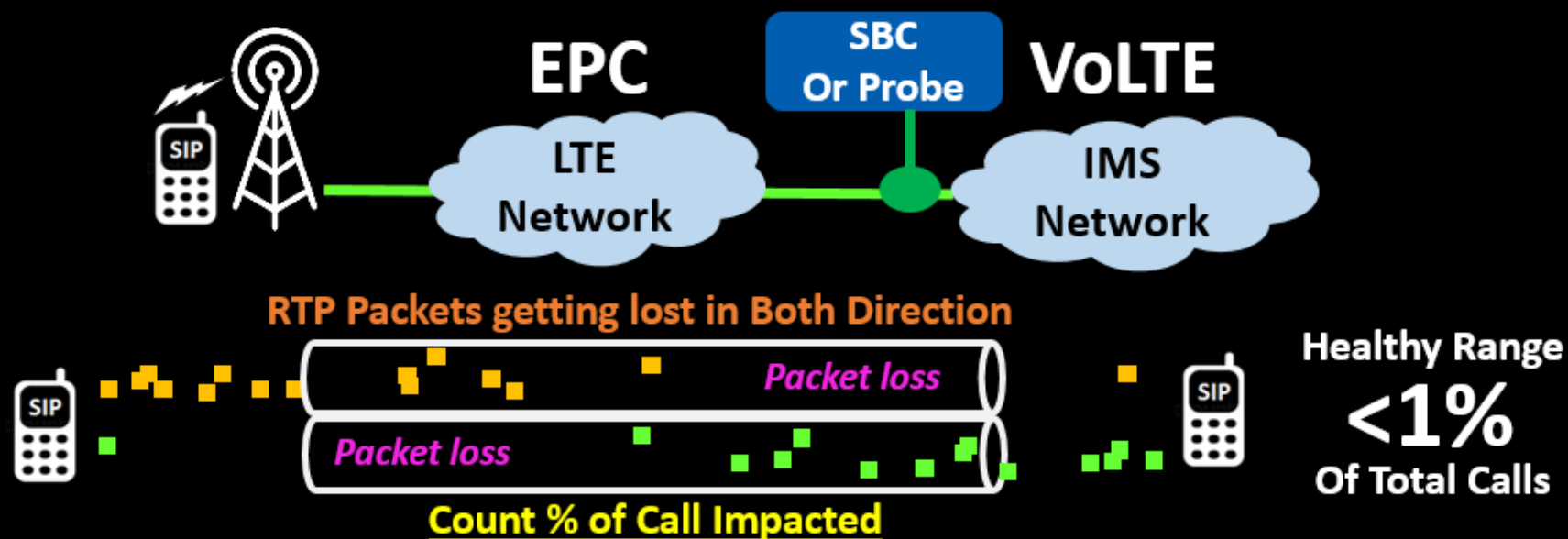


### Mute Rate (%)

MOS Score (1-5)

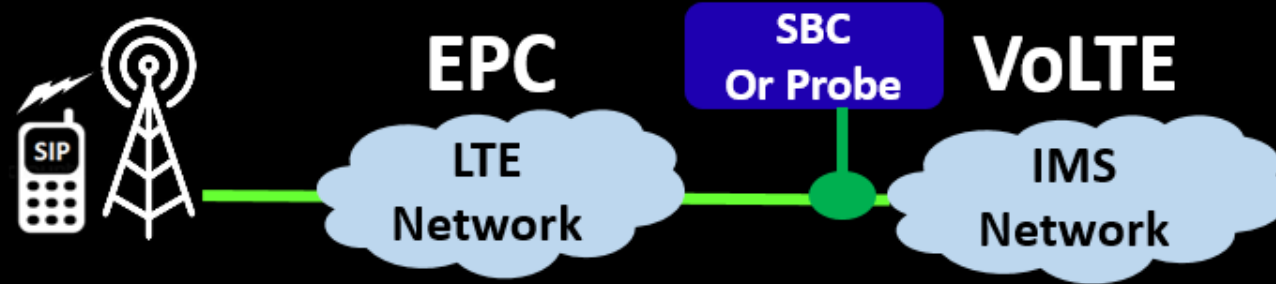
RTP Packet Loss (%)

One Way Calls (%)



Category	VoLTE service integrity (voice quality)
Source of Counter	External Probe / Packet capture or SBC for few OEMs
Formulae (%)	<i>% of Calls Muted ( samples &gt; 2 or 5s RTP loss in both direction will be treated as Muted call )</i>
Purpose of Counter	<b>Impact</b> :- User unable to Talk leading to degraded user experience

# MOS Score ( 1 to 5 )



## VoLTE User Plane Performance KPIs

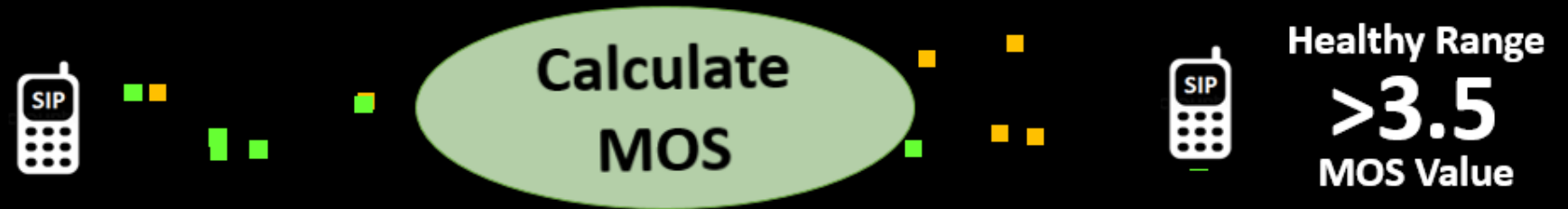
Mute Rate (%)



MOS Score (1-5)

RTP Packet Loss (%)

One Way Calls (%)



Category	VoLTE service integrity (voice quality)	
Source of Counter	SBC or External Probe / Packet capture	
Mean opinion score (MOS)		
MOS	Quality	Impairment
5	Excellent	Imperceptible
4	Good	Perceptible but not annoying
3	Fair	Slightly annoying
2	Poor	Annoying
1	Bad	Very annoying

MOS, Mean Opinion Score is a measure of voice quality, and is a quality measure that has been used in telephony for decades as a way to assess the human users opinion of call quality . **Impact** :- Low MOS bad speech Quality

# VoLTE RTP Packet Loss %

## VoLTE User Plane Performance KPIs

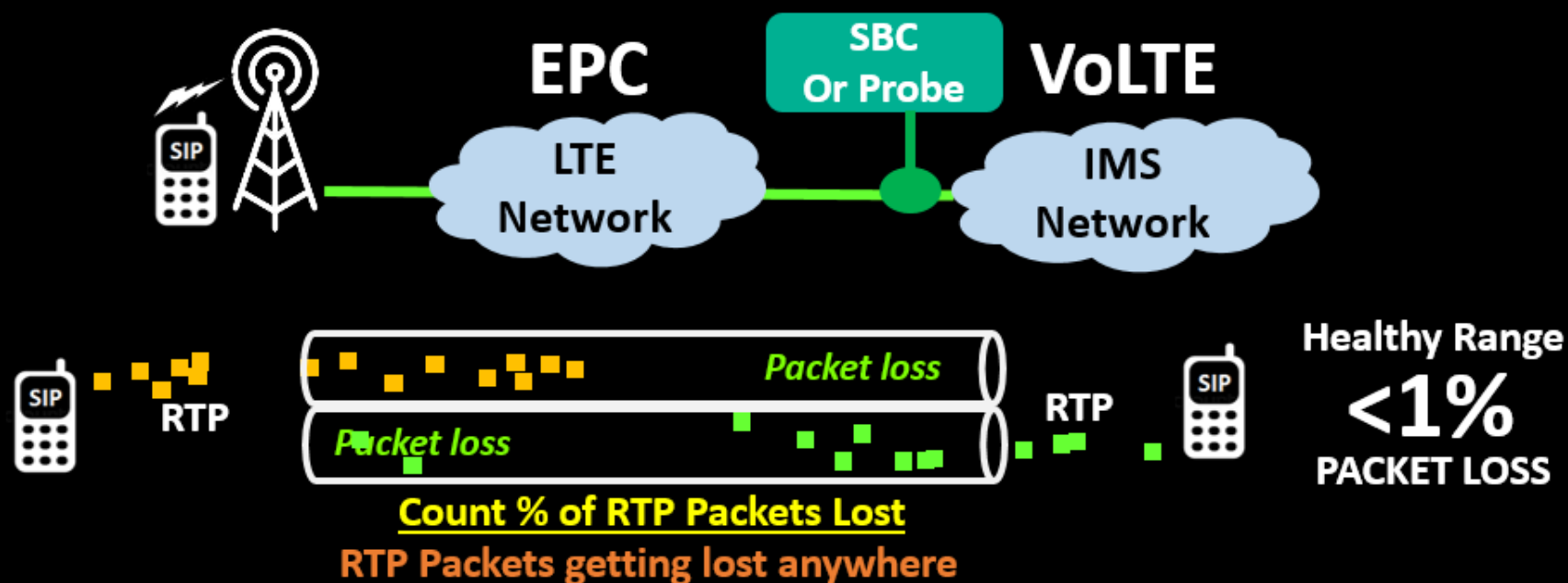
Mute Rate (%)

MOS Score (1-5)



RTP Packet Loss (%)

One Way Calls (%)



Category	VoLTE service integrity (voice quality)
Source of Counter	SBC
Formulae (%)	<i>% Percentage of RTP packets lost in the uplink or Downlink direction</i>
Purpose of Counter	<b>Impact</b> :- High Packet loss will lead to Mutes , One Way talk , Call Drops , Bad Quality , Garbled Voice

# One Way Calls (%)

## VoLTE User Plane Performance KPIs

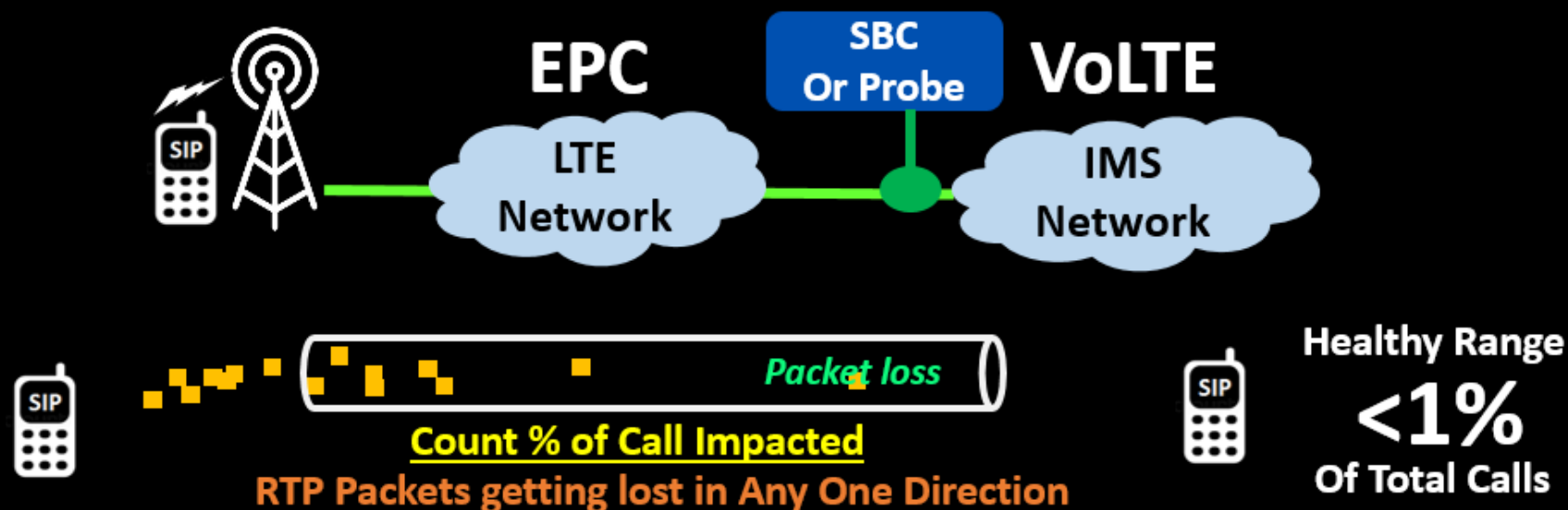
Mute Rate (%)

MOS Score (1-5)

RTP Packet Loss (%)

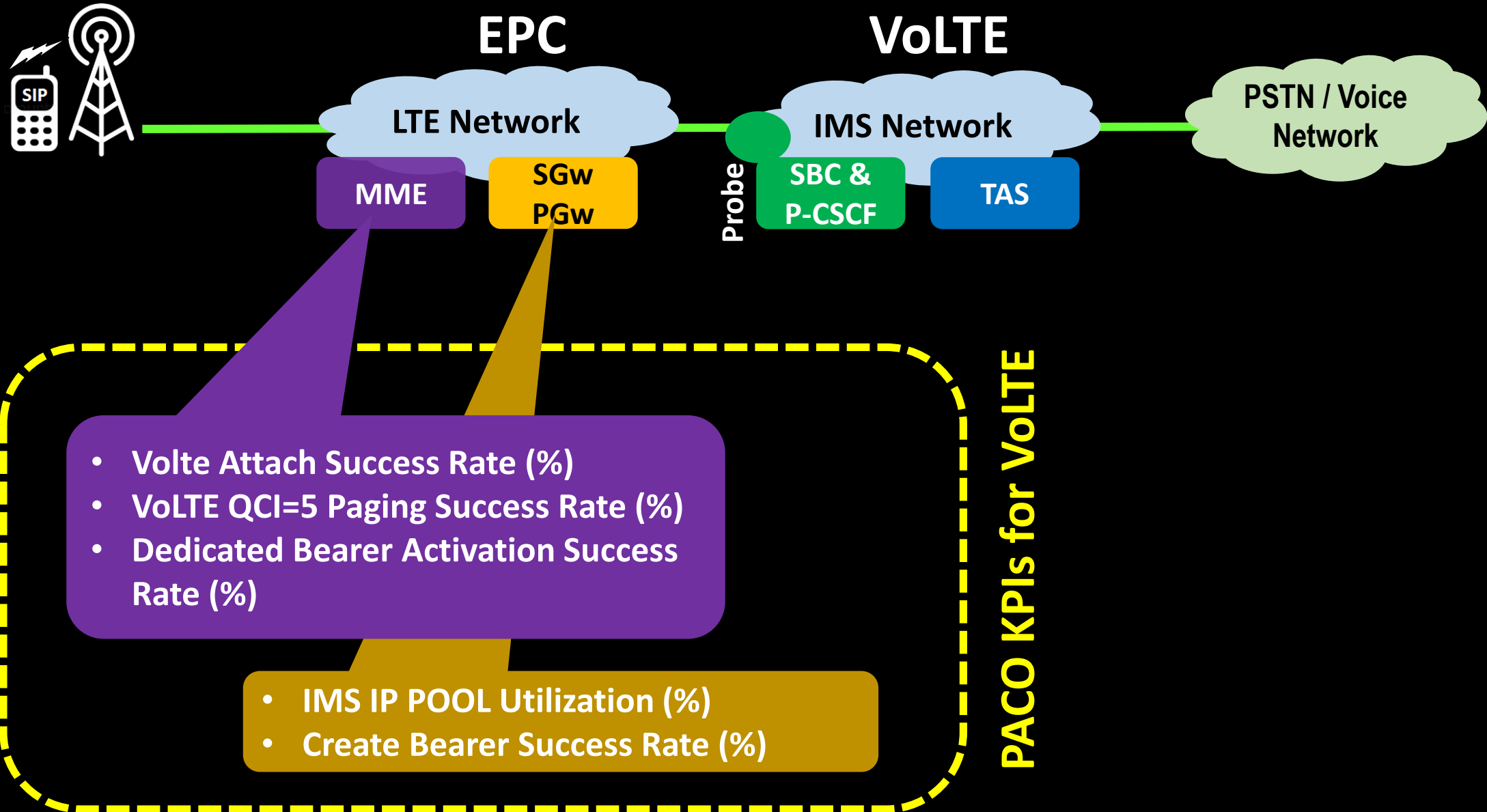


One Way Calls (%)



Category	VoLTE service integrity (voice quality)
Source of Counter	External Probe / Packet capture or SBC for few OEMs
Formulae (%)	<i>% of Calls having no Voice Packets Counts for 2 or 5 Sec in either the upstream or downstream direction, but not both</i>
Purpose of Counter	<u>Impact</u> :- One Way talk , leading to degraded user experience

# LTE / 4G – VoLTE KPIs & Performance indicators



# VoLTE **Attach** Success Rate (%)

# VoLTE **Bearer Activation** Success Rate (%)

## PACO KPIs VoLTE

✓ Volte Attach Success Rate (%)

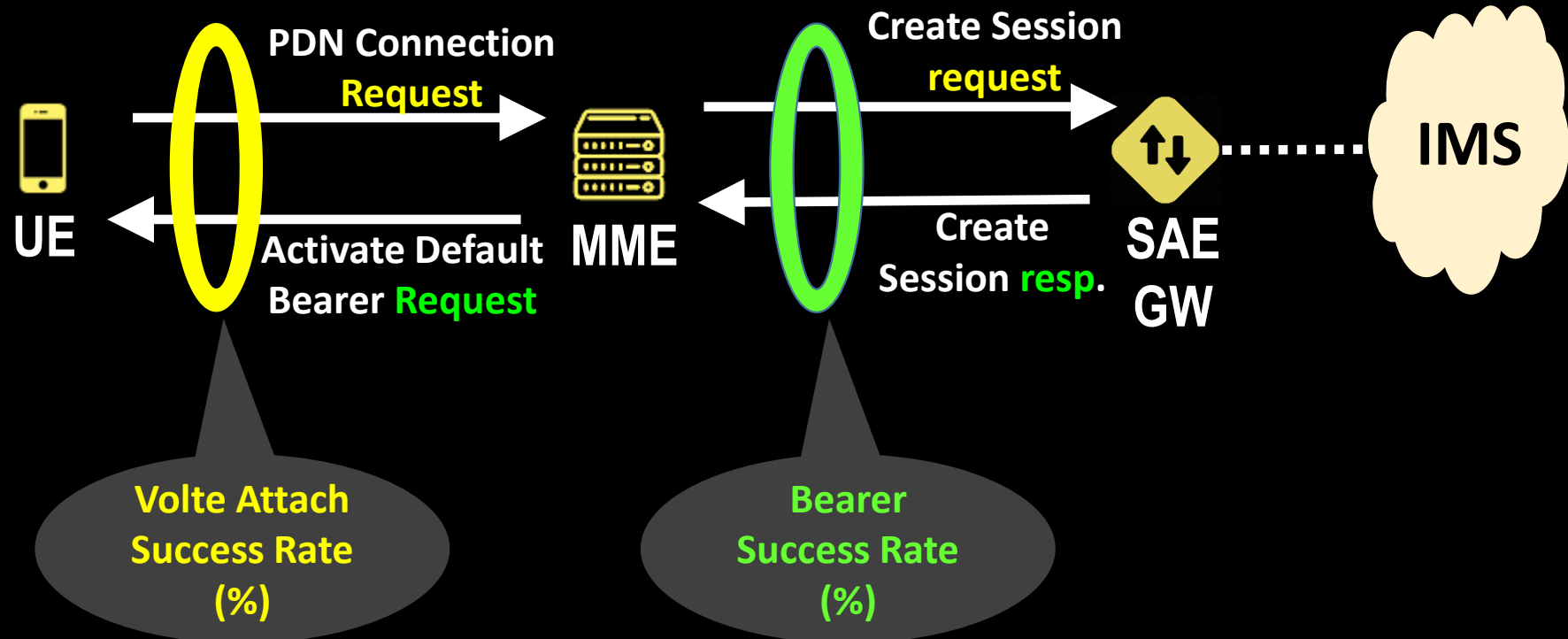
✓ Bearer Activation Success Rate (%)

VoLTE Paging Success Rate (%)

IMS IP POOL Utilization (%)

### Purpose of KPI

Impact :- Low Success Rate will lead to VoLTE Registration failures and customers will not be able to use VoLTE IMS Service





# VoLTE PSR - **Paging Success Rate (%)**

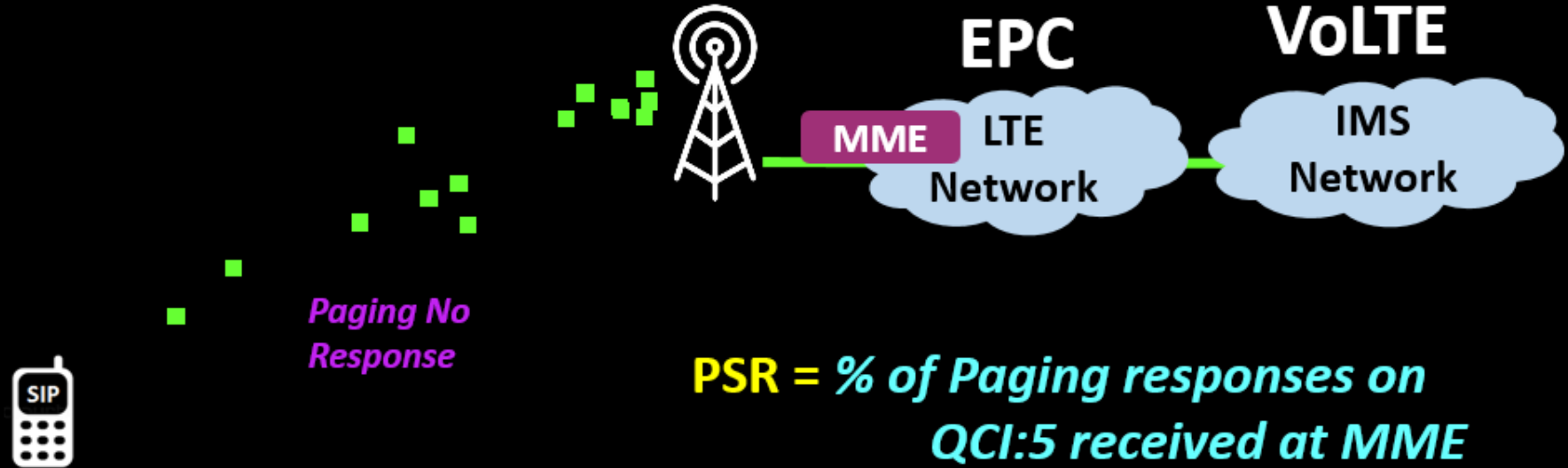
## PACO KPIs VoLTE

Volte Attach Success Rate (%)

Bearer Activation Success Rate (%)

✓ **VoLTE Paging Success Rate (%)**

IMS IP POOL Utilization (%)



**PSR = % of Paging responses on QCI:5 received at MME**

### Purpose of KPI

**Impact** :- Low QCI:5 PSR will lead to difficulties for users to receive Incoming Calls , They will remain in Out of Coverage

# VoLTE IMS IP POOL Utilization (%)

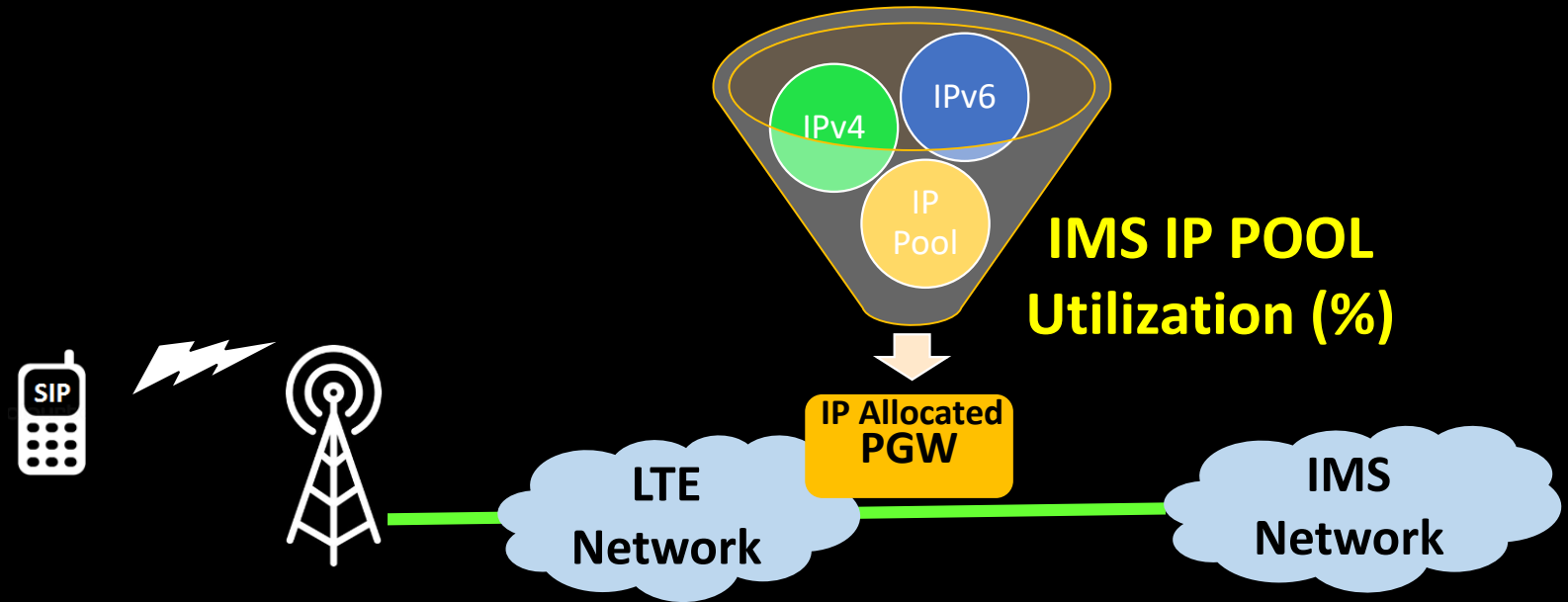
## PACO KPIs VoLTE

Volte Attach Success Rate (%)

Bearer Activation Success Rate (%)

VoLTE Paging Success Rate (%)

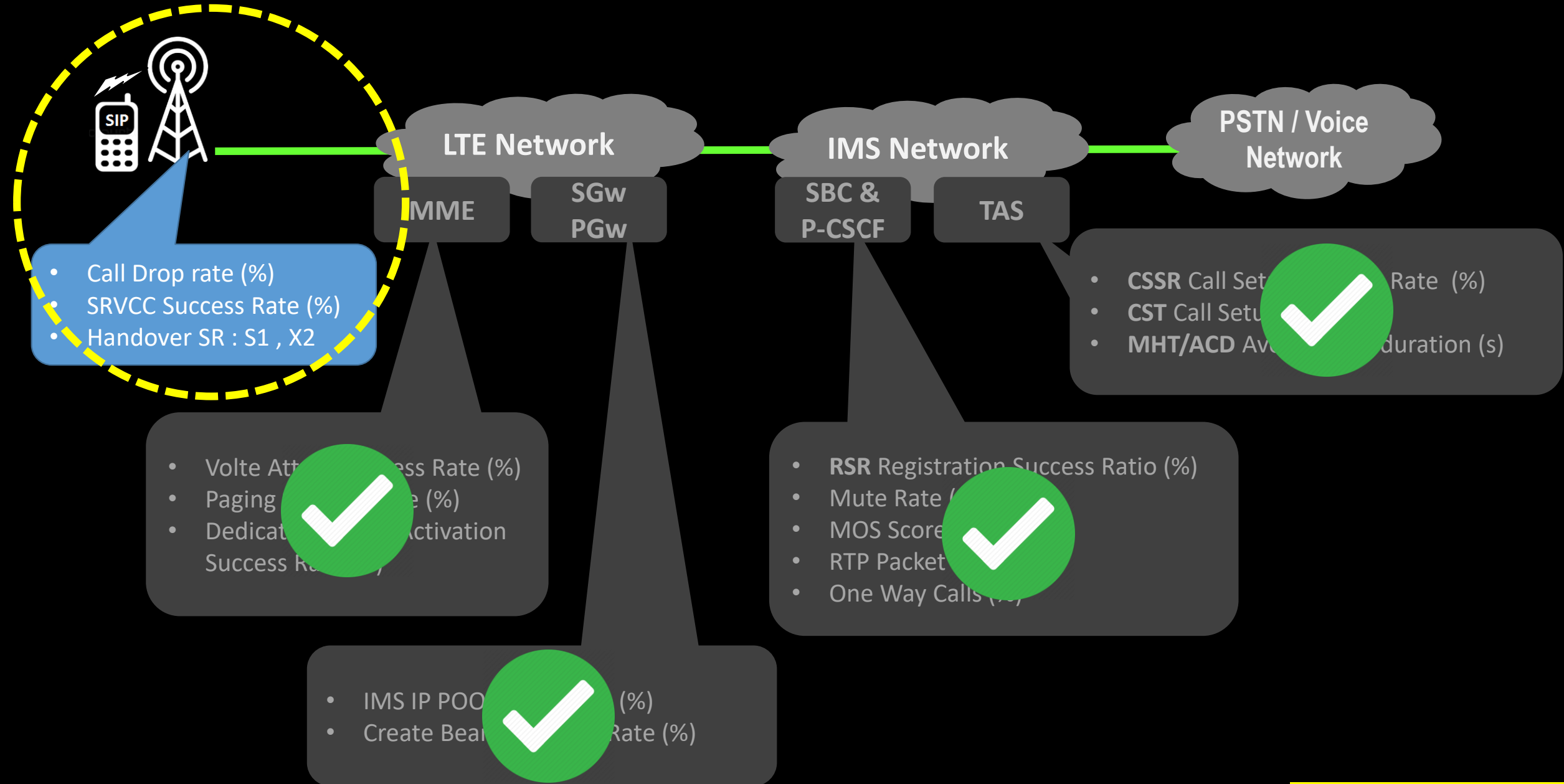
✓ IMS IP POOL Utilization (%)



### Purpose of KPI

**Impact** :- In case IP Pool Utilization is 100% , IMS VoLTE Users will not be able to Get IP Allocated for IMS APN & Will not be able to Register VoLTE , Thereby Users Will not be able to use VoLTE Network

# VoLTE IMS KPIs & Performance indicators







**Vikas Shokeen**

<https://telecomtutorial.info>

FOR



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Free Download – Presentation