GNSS Positioning Correction (GCM) & Roadside Ranging Augmentation (RRM)			
Requirements	**Messages**	**GCM**	**RRM**	**Comment**
Transmission Rate (RTCM 1077+1087+1097)	1*3 Hz	Typical 9~12 Hz, Max'20Hz.	GCM: 1 Hz each for three payload types. The GCM service announcement (RTCM 1005) is also 1 Hz, but much shorter message type. RRM: Max 20 Hz but will vary from 3~12Hz. Typically like CAM generation rules (range measurements will align with vehicle dynamics). There is a max limit of 20Hz as per EN 302 571, so even if the application is going to request 60Hz the DCC is going to drop the packets (and limit it to 20Hz). Which RSUs to range to and how much to range is left as a differentation feature for product developers. The standards sets the max limits only (which is the same as curent EN 302 571 and later will be capped by the usage rate of a car to be specified as less than 3% in the new EN 302 571).
Transmission dynamics	Average	Not	The GCM message has a length variation (see the message size information below), while the RRM has fixed size.
Area of relevance urban	1000 m	300 m	Multi-hop broadcast can be used in GCM case, and single-hop unicast in RRM case
Area of relevance rural roads	+/- 5000 m	700 m	Estimation: half-distance between roadside units. RRM: used in Tunnels.
Area of relevance rural highways	+/- 1000 m	1000 m	Estimation: half-distance between roadside units. RRM: not applicable because there will be no triangulation possibility along one line.
Message Size	200 - 1100 Byte	32 Bytes	Estimation includes 96 bytes security header for GCM (400 everage). RRM messages are short, but effect of Contention Window size must be included. (20 bytes data + Contention Window size). RRM: Fixed sized packet, MAC layer data frame with zero length. PHY MCS r-1/2 16QAM assumed and should be used (64 us on air time). Total Data-Ack is around 160us (per range measurement).
Message validity			Currently not defined
Message Priotiy			Currently not defined
Transmission mode	Broadcast	Unicast	
Transmission type	Repetitive	Repeats (as CAM)	
Urban network message channel load	<2.5%	<100%	Based on 6 mb/s channel capacity. GCM: 3*1 Hz rate for RTCM 1077+1087+1097, 6 rebroadcasts from various directions. RRM: In a typical deployment around 200~250 vehicles will use this service with a channel load of 40~50%.
Rural roads network message channel load	<1%	<25%	Based on 6 mb/s channel capacity. GCM: 3*1 Hz rate for RTCM 1077+1087+1097, 2 rebroadcasts from the two directions. RRM: 0.1% (only in tunnels where this serive will be typically used). Only range to 1 or 2 R-ITS.
Highway network message channel load	<1%	<.0%	
V2V	-	X	
I2V and V2I	X	Yes	
V2E and E2V	-	X	
Reception Probability Requirement	Standard	Standard	Transmission rate is sufficiently high for packet loss to be tolerated.
Security requirements	C-ITS	C-ITS	Main risk is spoofed position data by fake RSU.
Liability Impact	No	No	Low - Augmentation service -- requires other sensors for integrity check
Functional Safety Requirements	ASIL QM	ASIL QM	As this is not part of the safety information exchange it self but an indirect parameter only through the confidence level there is influence.
SOTIF	No	No	See FSR