Communication Method	Description	Advantages	Disadvantages
Wired Communication	The robot is physically connected to a hand held controller or a computer through a cable.	• Bidirectional communication • Consistent communication • Can provide power along with communication link and a tether in case of breakdown	• Creates constraint on movement around corners • Limits range to the length of available cable • Function is similar to that of the current pigging solution
Acoustic Communication	Tracking via the acoustic wave generated by the friction between the robot and pipe wall.	• Provides tracking capability without requiring a transmitter which is expensive and requires power supply	• Acoustic signals generated are cluttered by noise from vehicles and machinery above ground • No tracking data when stationary • Not capable of transmitting more complex data
Extremely Low Frequency (ELF)	Communication through the use of Extremely Low Frequency (ELF) waves which are characterised as being in the range of 3-30 Hz	• Bidirectional communication • Small and lightweight transmitters • Experiences low noise interference	• Experiences large attenuation and requires complex software to recover signal
Magnetic Communication	Equip the robot with static magnetic field and detect it with a magnetometer	• Low attenuation when used at low frequencies • Transmitters are very cheap	• Unidirectional communication • Bulky permanent magnets required to be put on robot in order to create static magnetic field