



MultiGNSS tradeoffs for Consumers

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Who is CSR?



- Global company headquartered in Cambridge, UK
- Approximately 1200 people worldwide
- Approximately \$800M annual revenue
- Location team acquired from SiRF in 2009

Mobile

Handsets, Cameras



Handsets



Cameras



Auto

Automotive, PNDs



Infotainment



Telematics



PNDs



Home

Document Imaging, Gaming & HE, Health & Fitness, PCs & Tablets, Voice & Music

Gaming & HE



Voice & Music



PCs



Tablets



Document Imaging



Health & Fitness



What do receiver manufacturers want from providers?

- Level playing field
 - Open ICD gives maximum ability to innovate and differentiate
- Stable plan
 - Once signals are commercially established, need to remain active for as long as possible
 - 10 year notice to terminate is a minimum
 - New signals committed in advance
 - Weak signal receivers need to know all possible sources of cross correlation
- Notification and communication on status
 - Anomaly reporting
 - Priority help desk for addressing unexpected observations

- Dual band receivers are now commonplace
 - L1 and GLONASS today
 - Expect most consumer receivers to retain dual band capability although bands themselves may change over time
- Benefit of multi-GNSS and improved immunity to jamming has been market proven
- Lower L-bands with more power and better penetration are attractive
- Wider bandwidths use more power and are more susceptible but provide better multipath
 - Tradeoff made depending on target market

- Low rate codes are great for consumer needs
 - Sufficient accuracy and quick acquisition
- Longer codes create new tradeoffs
 - Exponential growth in memory (die size) to maintain acquisition
 - Improved cross correlation
- However, connected receivers becoming more common
 - Mitigates impact of acquisition
 - Greatly reduces need for data transmission

Conclusion

- Whatever you launch, we will use
- The more you communicate, with more notice and with less change the better the user experience