



***U.S. Outcomes and Views of the
April 2013 Interoperability
Workshop***

8th Meeting of the ICG

November 2013

Dubai, UAE



ICG Work Plan: Working Group A



- Interoperability Tasks
 - Consistent with the principle of interoperability and its definition, consider the perspective of various user applications and equipment manufacturers
 - Continue efforts to survey industry and user community experts
 - Sponsor and participate in workshops and meetings designed to solicit GNSS user input



ICG-7 Recommendation



- Consistent with the principle of interoperability and its definition, and the implementation of previous ICG recommendations related to interoperability, the ICG should host an interoperability workshop in conjunction with the ION Pacific PNT meeting, April 22-25 2013.
- The ICG will request inputs from potential participants prior to the workshop through existing web sites related to GNSS information dissemination, conferences, major PNT organizations and events.
- The following interoperability subjects may be addressed:
 1. Potential for a common third open service signal
 2. Frequency diversity vs. frequency commonality
 3. DOP improvement with the addition of 2nd, 3rd, 4th, Nth global constellation
 4. System provider time and geodetic reference frame implementation as described by the ICG WG-D templates
 5. Potential opportunities to utilize existing or planned spare capacity in civil/open service or SBAS navigation messages in order to increase multi-GNSS interoperability



Interoperability Workshop Details



- Workshop held 25-27 April 2013 in Hawaii
- 40 participants in person and 5 additional online or recorded presentations
- 5 out of the 6 GNSS Providers represented
- 16 presentations
- 3 categories of industry represented
 - Aviation/Certified Avionics
 - Medium/High Precision Receivers (e.g. agriculture)
 - Consumer Applications (e.g. cell phones)



Industry Participants



- 11 Industry Representatives/Presentations
 - MITRE (aviation/certified avionics)
 - Rockwell Collins (aviation/certified avionics)
 - Hemisphere GPS (Medium/High Precision Receivers)
 - Septentrio (Medium/High Precision Receivers)
 - Trimble (Medium/High Precision Receivers)
 - John Deere (Medium/High Precision Receivers)
 - Topcon (Medium/High Precision Receivers)
 - CSR plc (Consumer Applications)
 - ST Microelectronics (Consumer Applications)
 - Broadcom (Consumer Applications)
 - Qualcomm (Consumer Applications)



U.S. Compilation of Industry Responses



- Based on an in depth review of information provided by the industry participants, including:
 - Written answers
 - Presentations given at the workshop
- Best interpretation required
 - Some industry answers were ambiguous
- Only yes/no questions and answers included in the results
- Not all questions answered by all participants



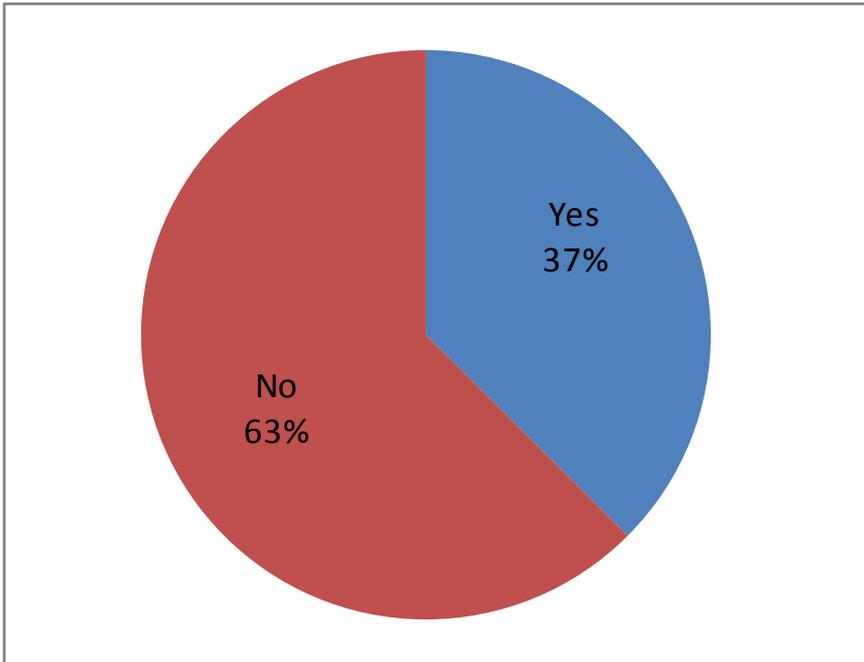
Industry Responses to Questions



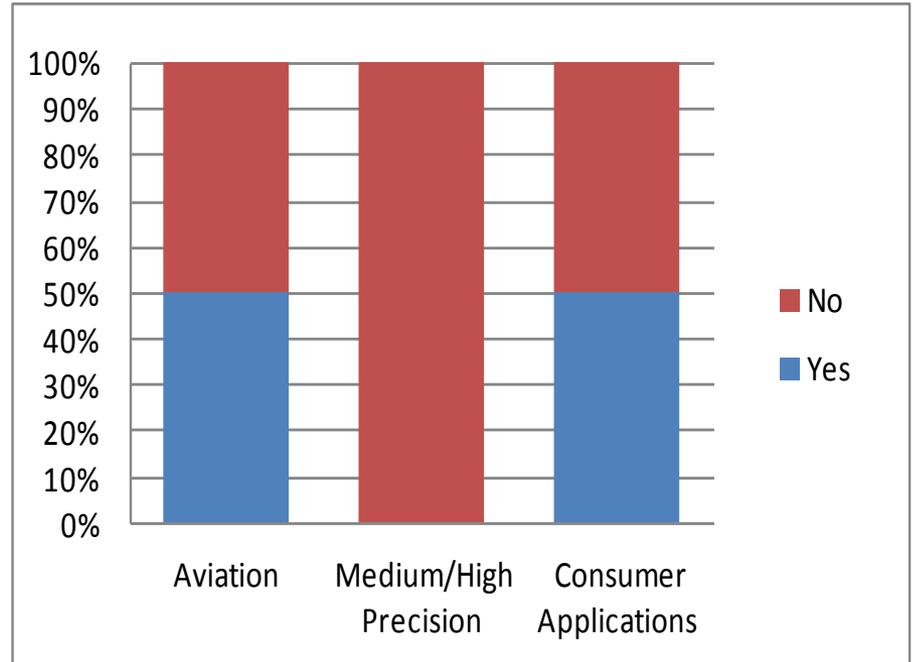
Question #1:

Do you see a threat to GNSS receivers due to many more GNSS signals centered at 1575.42 MHz?

Overall Response*



Response Breakdown by Sector



*8 Total Responses to the Question



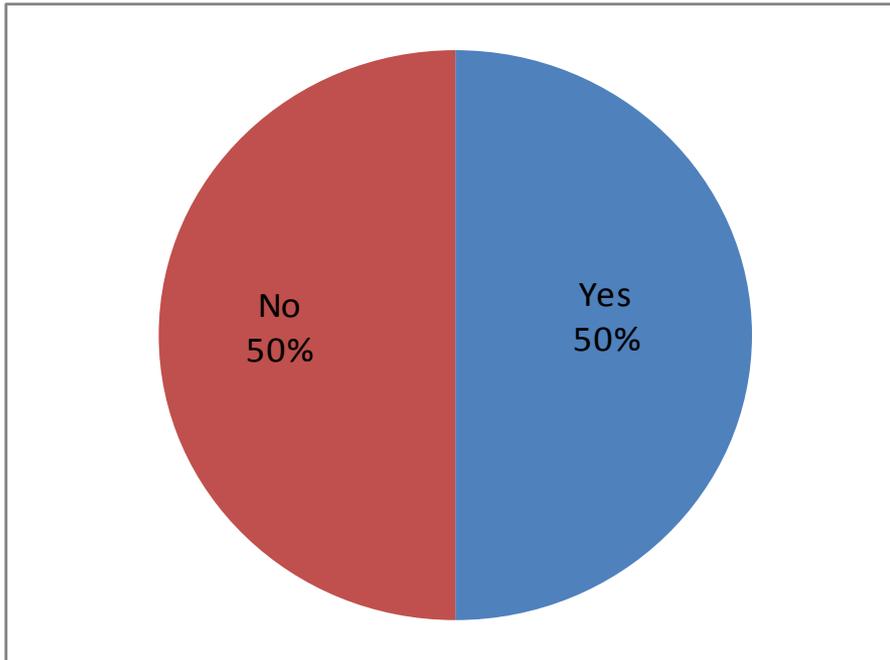
Industry Responses to Questions



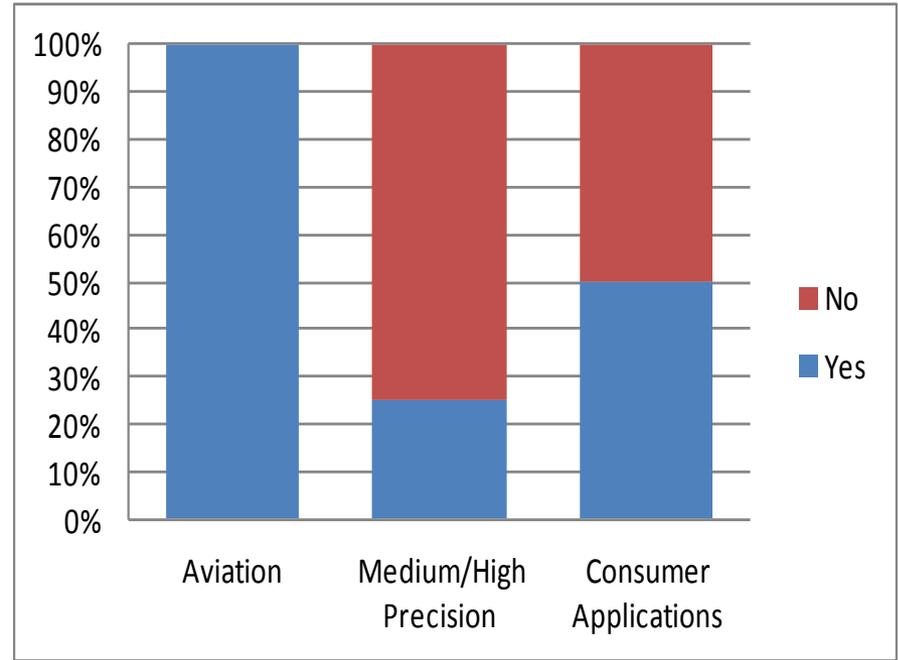
Question #2:

Do you prefer all new CDMA signals at “L1” to be centered at 1575.42 MHz?

Overall Response*



Response Breakdown by Sector



*10 Total Responses to the Question



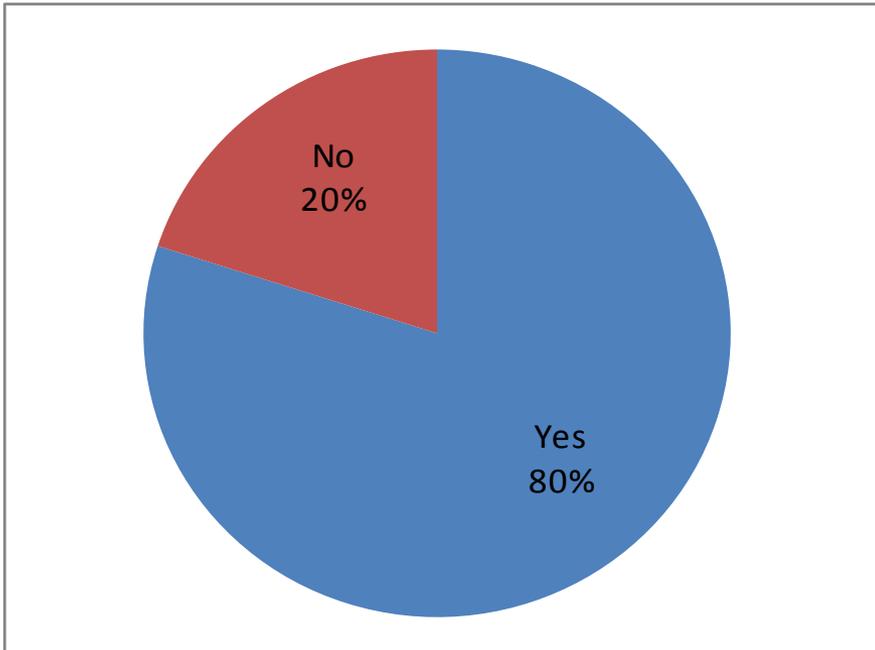
Industry Responses to Questions



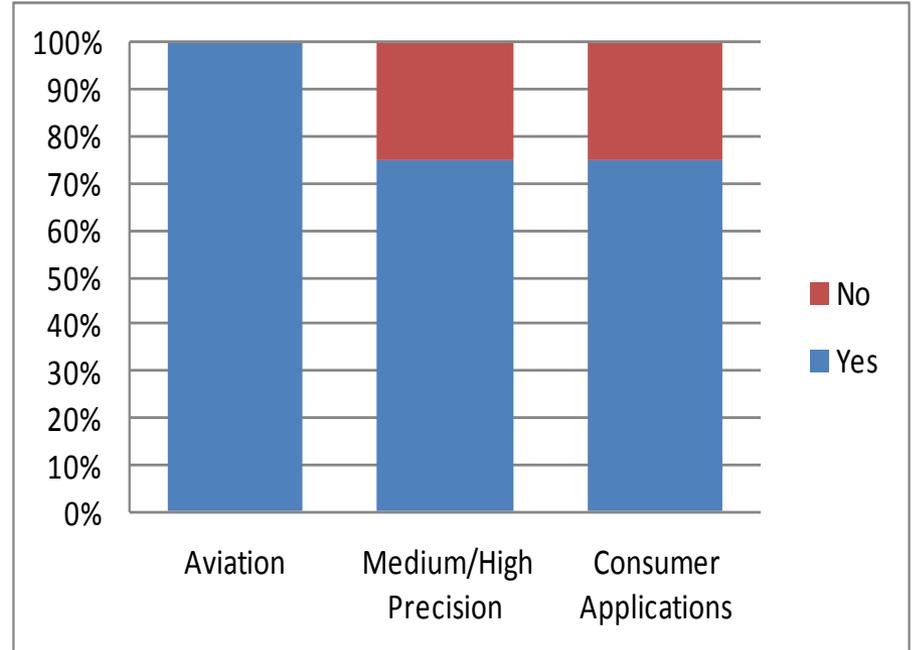
Question #3:

Will you continue to use C/A in the longterm?

Overall Response*



Response Breakdown by Sector



*10 Total Responses to the Question



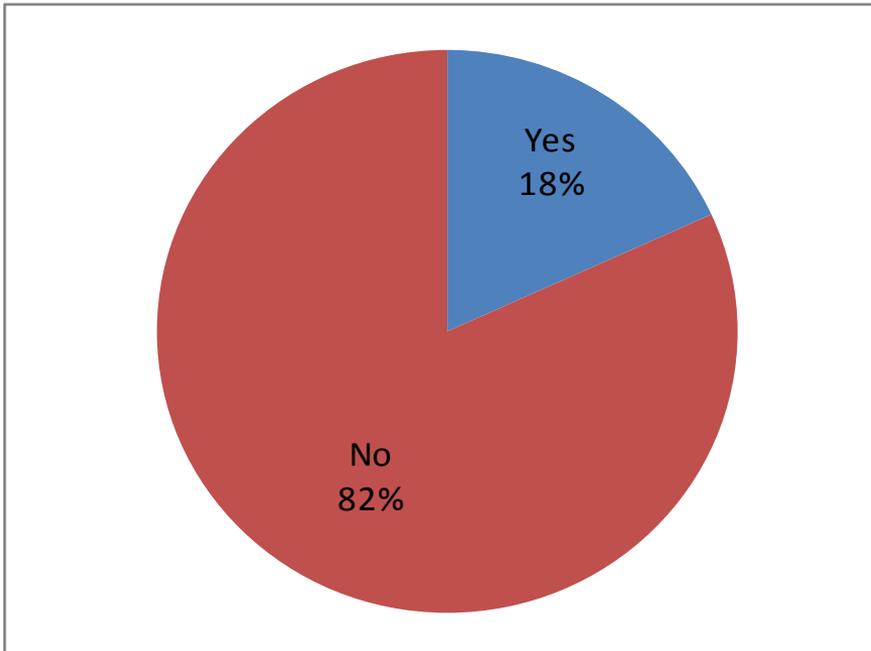
Industry Responses to Questions



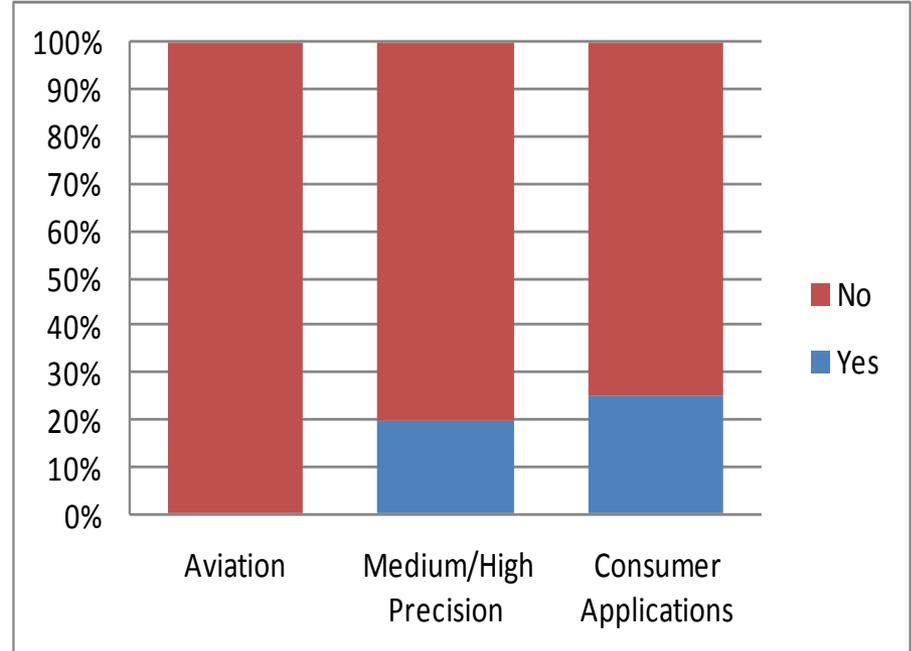
Question #4:

Once there are a large number of good CDMA signals, will there be continuing commercial interest in FDMA signals?

Overall Response*



Response Breakdown by Sector



*11 Total Responses to the Question



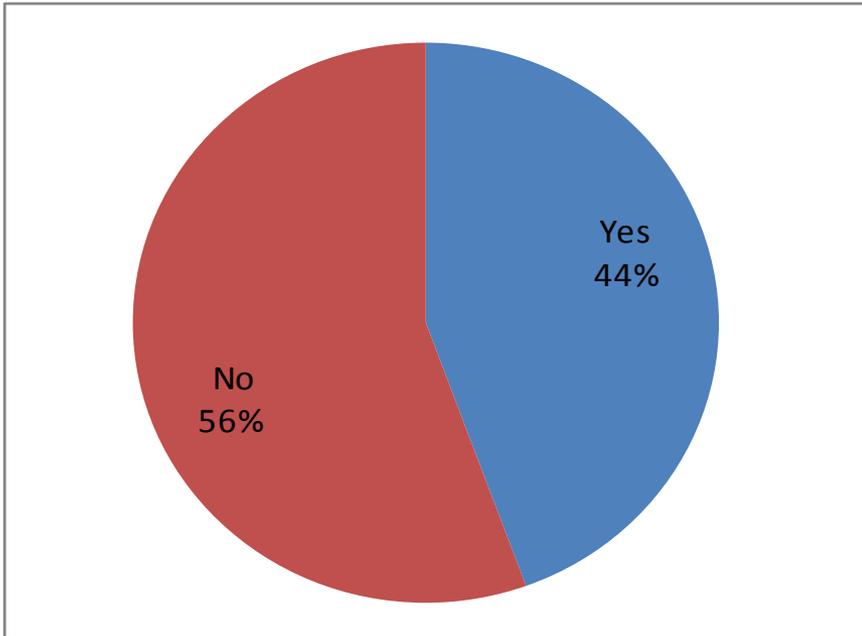
Industry Responses to Questions



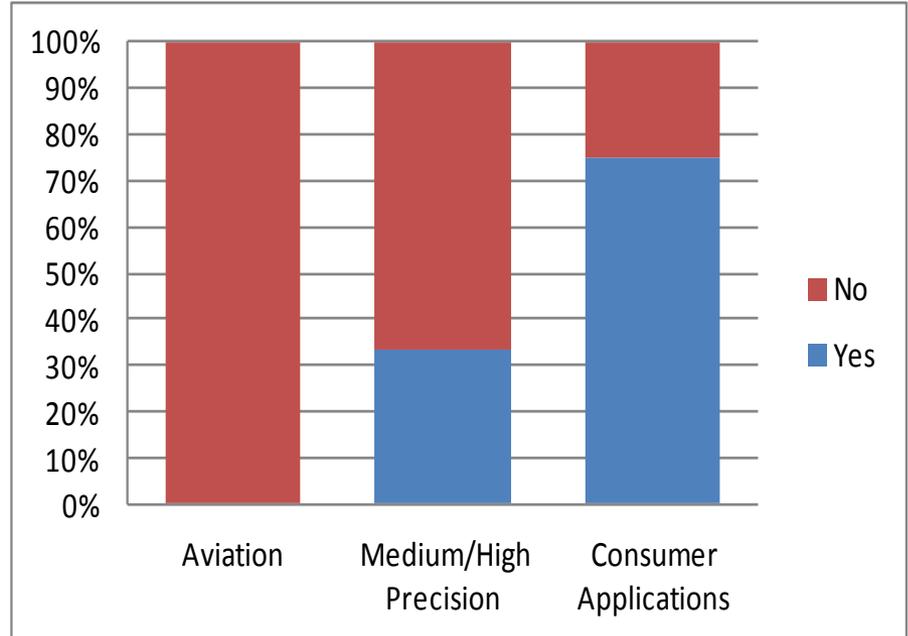
Question #5:

Do you prefer signals in different “L1” frequency bands (rather than at one center frequency)?

Overall Response*



Response Breakdown by Sector



*9 Total Responses to the Question

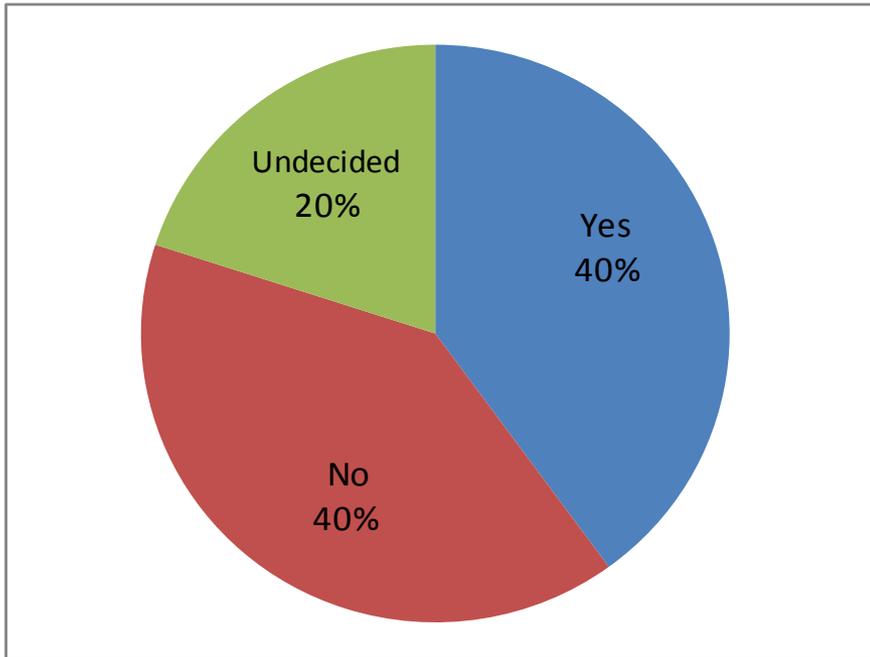


Industry Responses to Questions

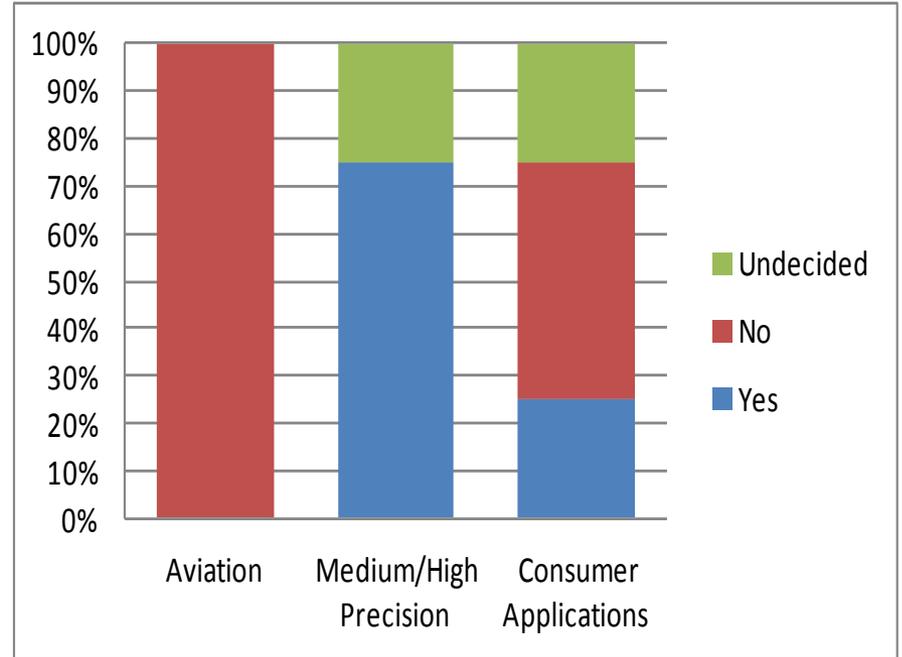


Question #6: Do you intend to use the E5b signal?

Overall Response*



Response Breakdown by Sector



*10 Total Responses to the Question



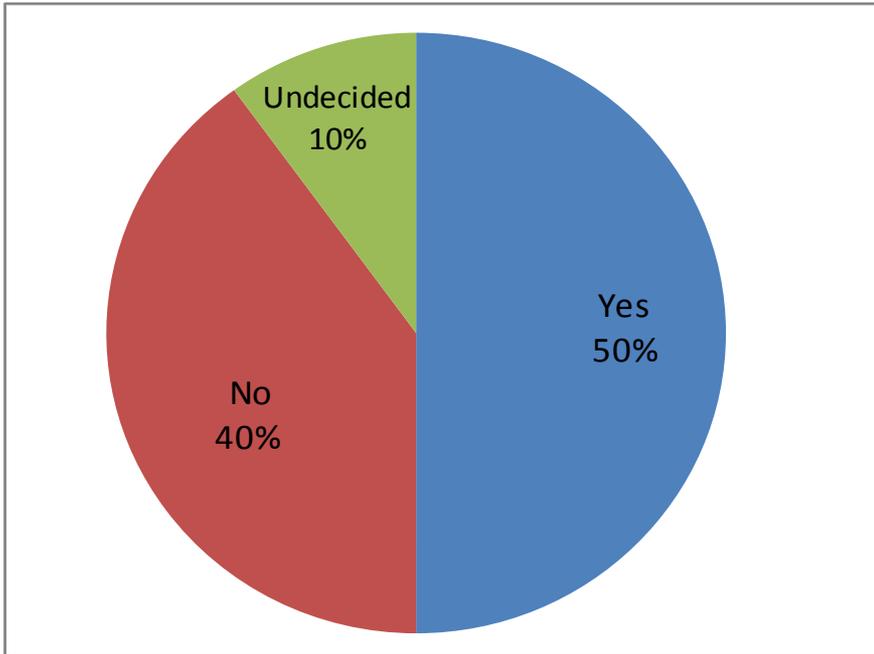
Industry Responses to Questions



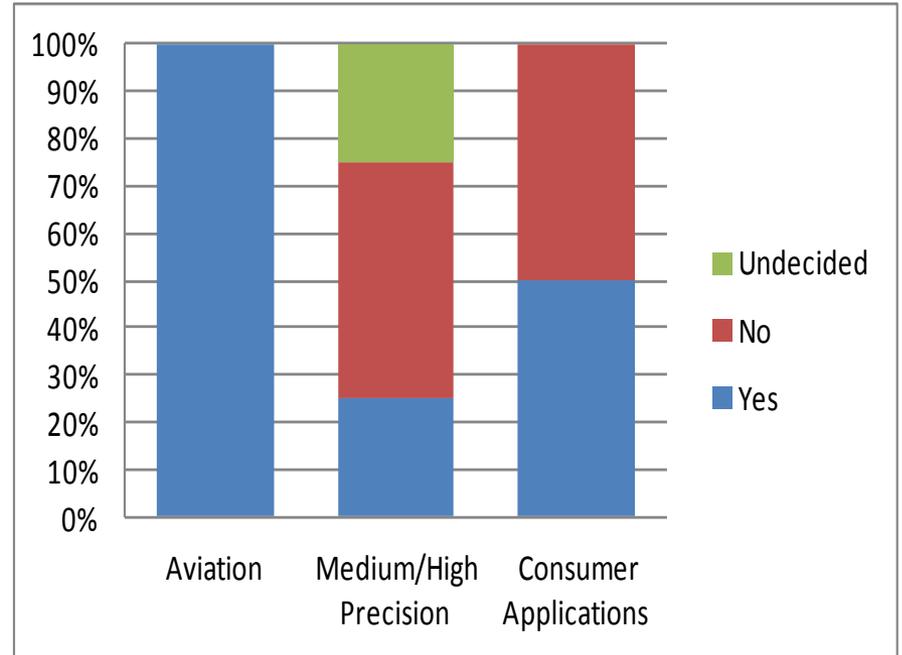
Question #7:

For your applications, are small satellite “frequency steps” a problem?

Overall Response*



Response Breakdown by Sector



*10 Total Responses to the Question



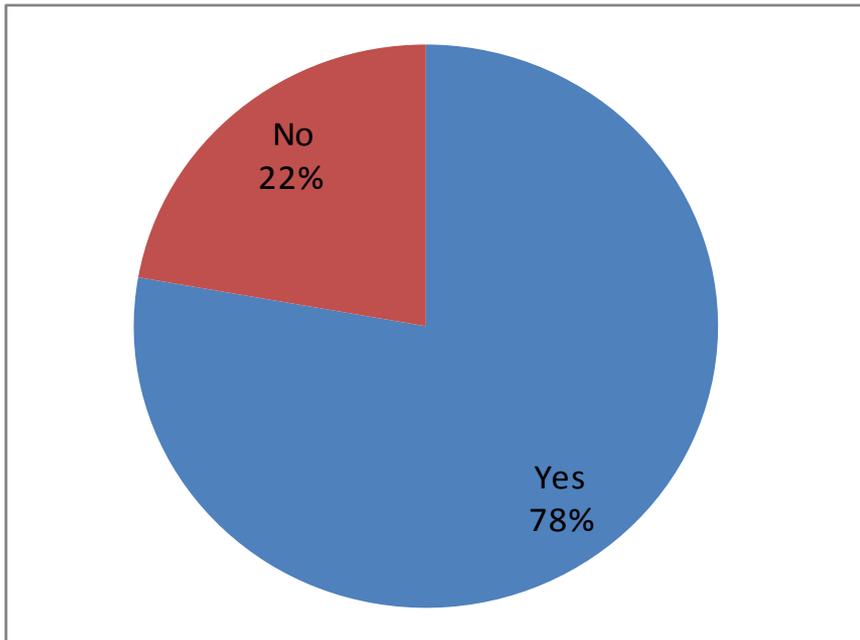
Industry Responses to Questions



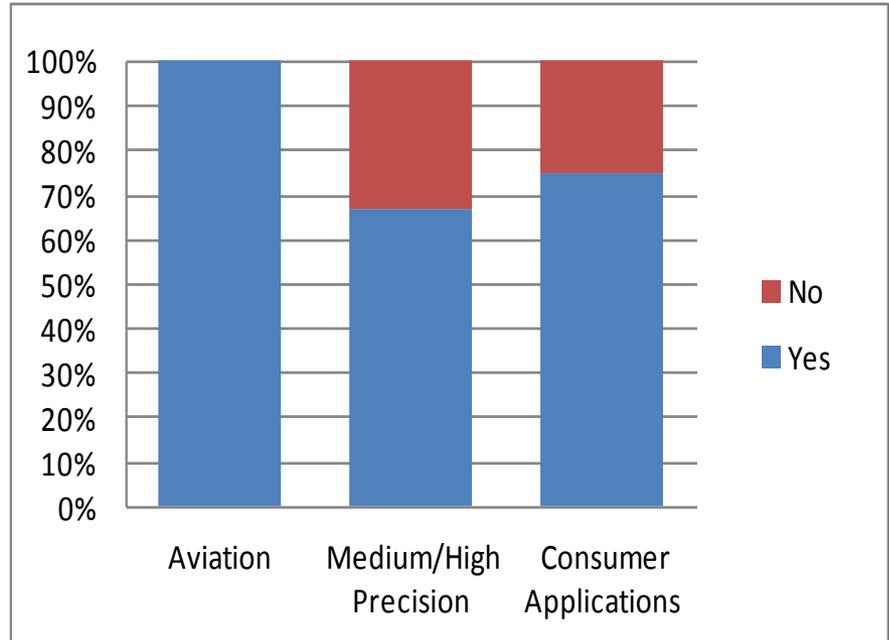
Question #8:

Assuming signal quality is acceptable from every provider, would you limit the number of signals used?

Overall Response*



Response Breakdown by Sector



*9 Total Responses to the Question

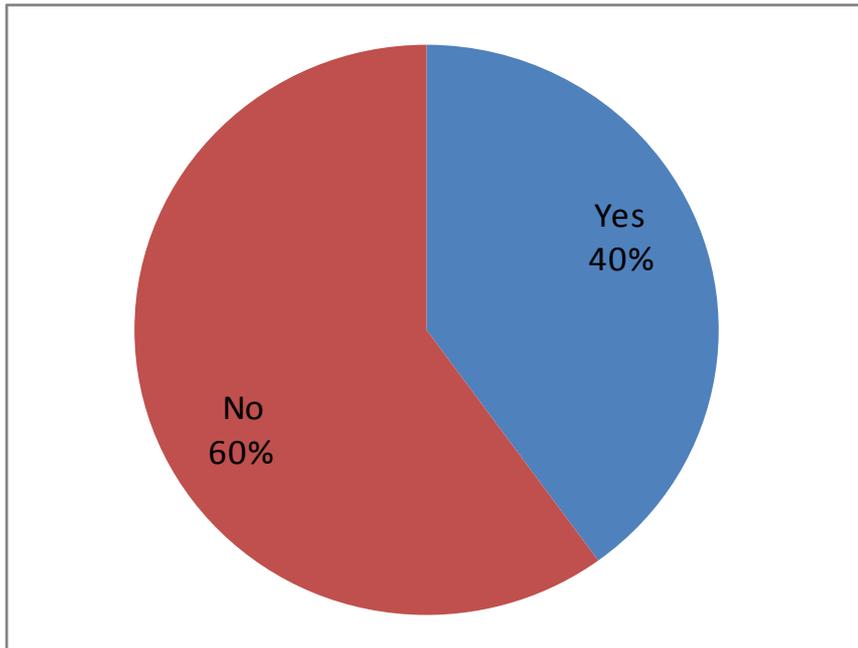


Industry Responses to Questions

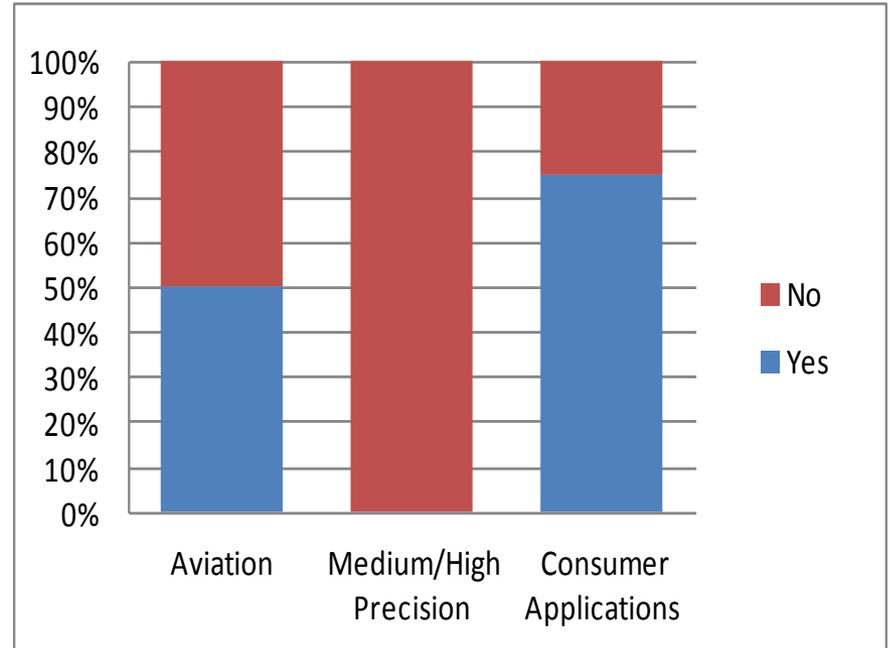


Question #9: Is having more signals inherently better?

Overall Response*



Response Breakdown by Sector



*10 Total Responses to the Question



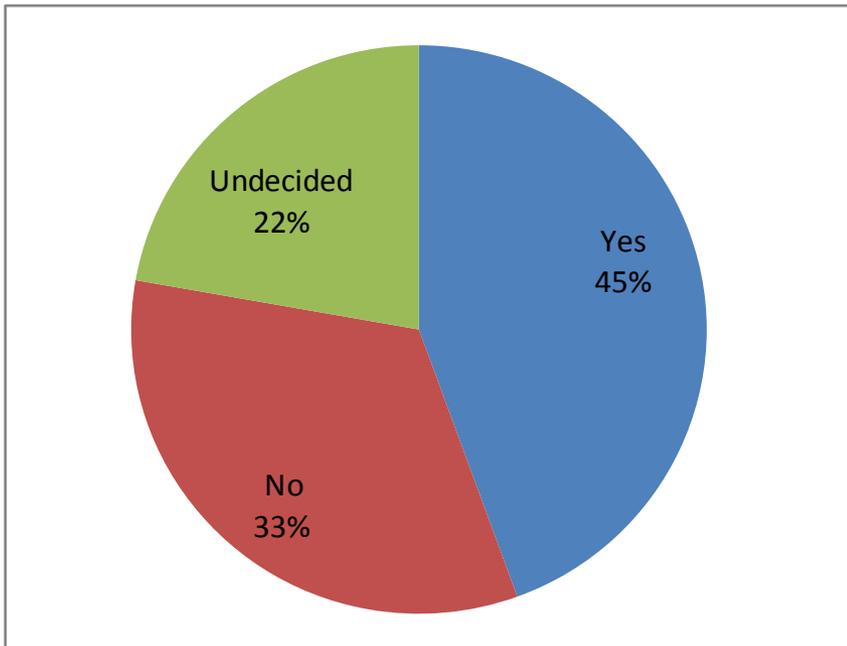
Industry Responses to Questions



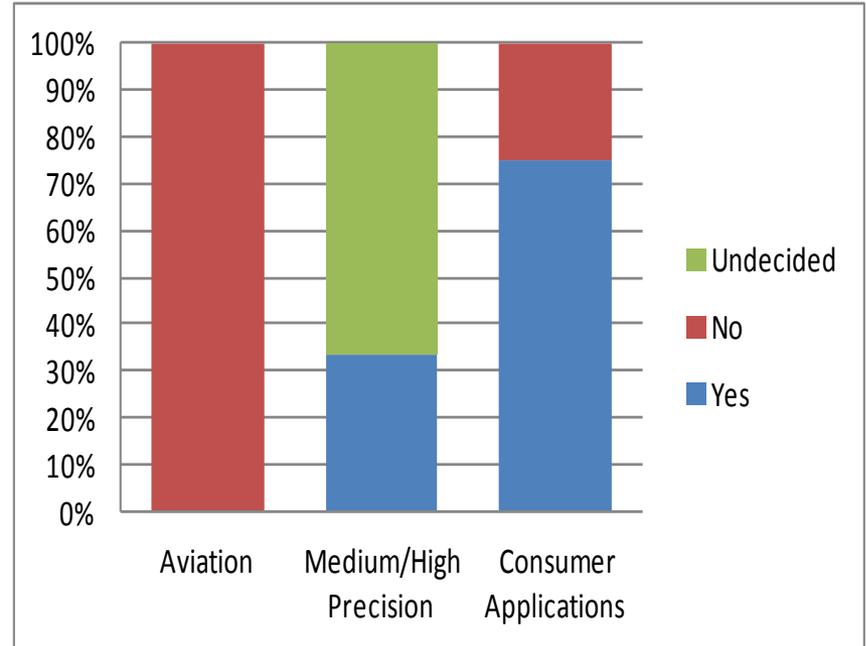
Question #10:

Will the marketplace “force” you to make use of every available signal?

Overall Response*



Response Breakdown by Sector



*9 Total Responses to the Question



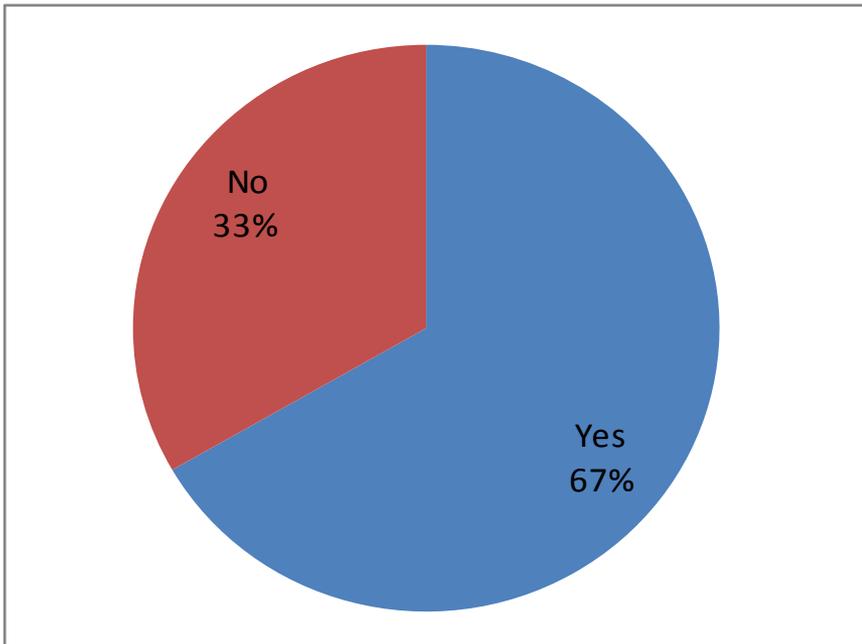
Industry Responses to Questions



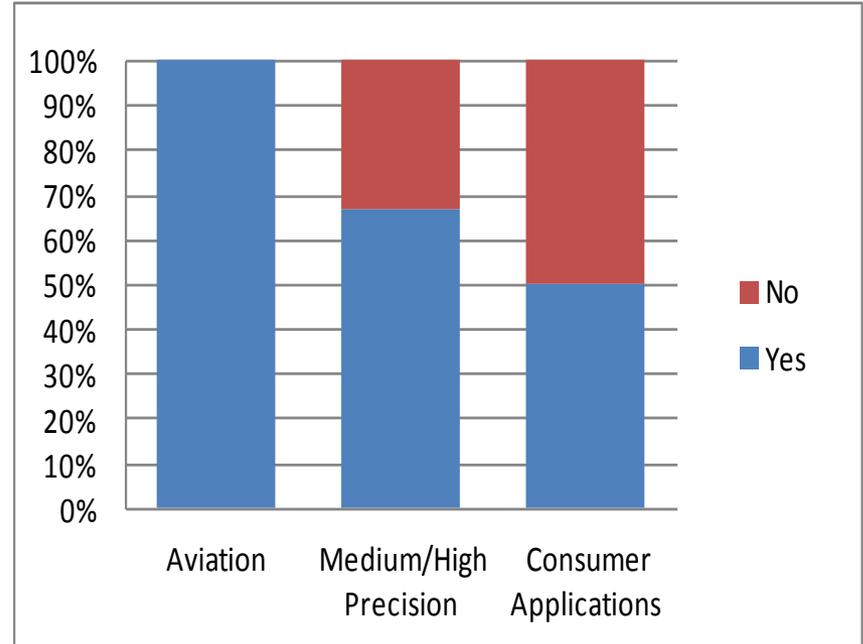
Question #11:

Is having a common center frequency very important?

Overall Response*



Response Breakdown by Sector



*9 Total Responses to the Question



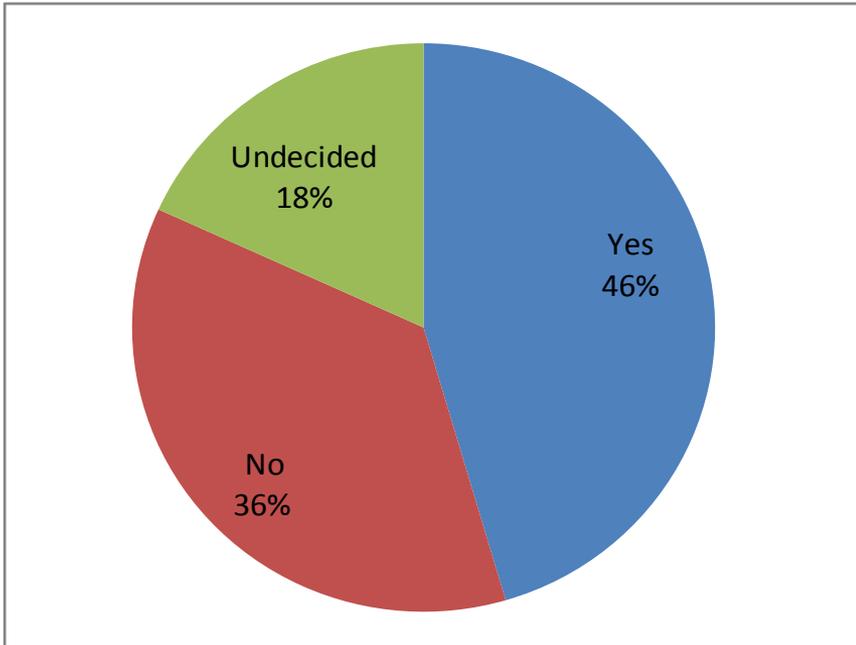
Industry Responses to Questions



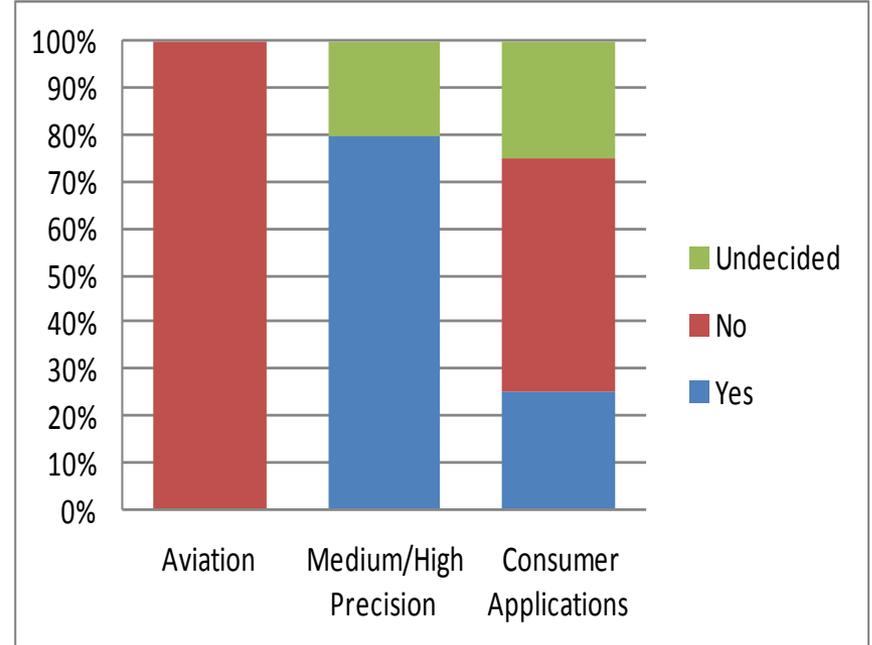
Question #12:

Will you provide “tri-lane” capability in the future?

Overall Response*



Response Breakdown by Sector



*11 Total Responses to the Question



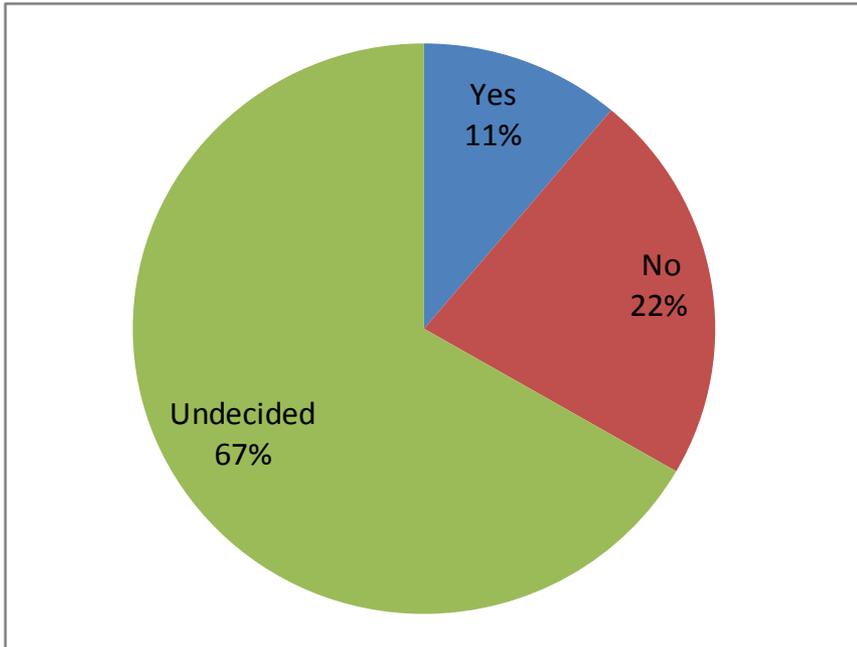
Industry Responses to Questions



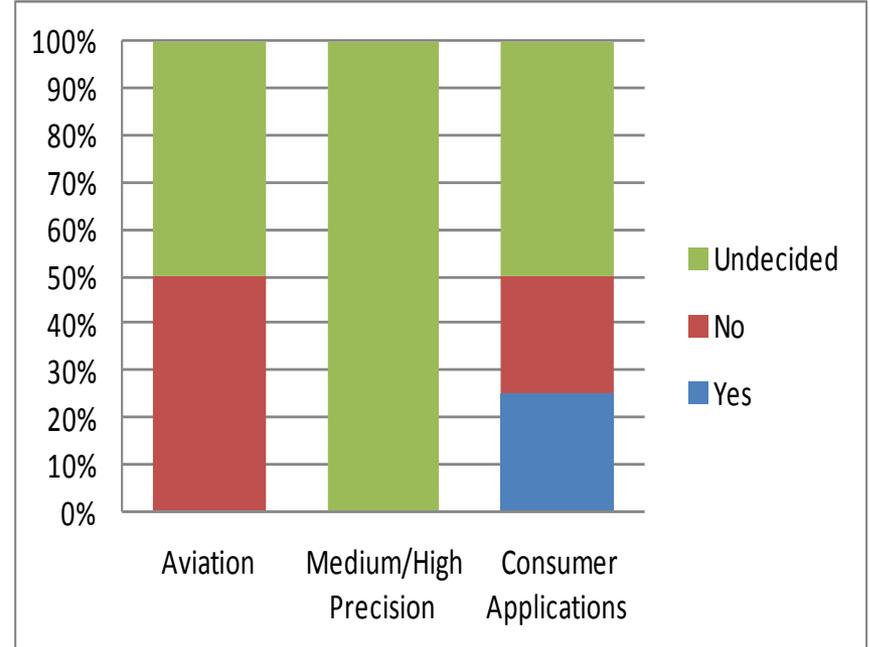
Question #13:

Would you prefer a common open signal in S Band?

Overall Response*



Response Breakdown by Sector



*9 Total Responses to the Question



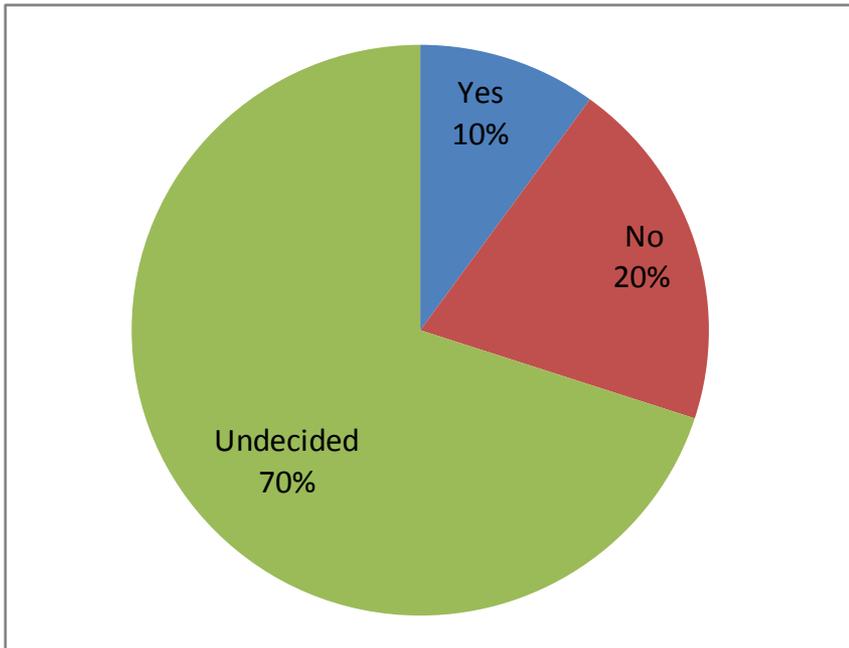
Industry Responses to Questions



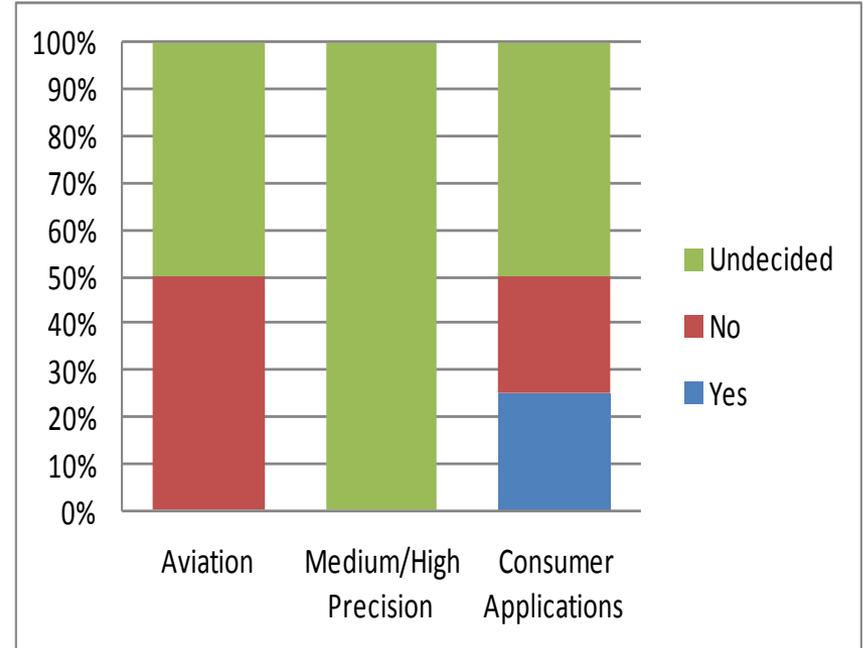
Question #14:

Would you prefer a common open signal in C Band?

Overall Response*



Response Breakdown by Sector



*10 Total Responses to the Question



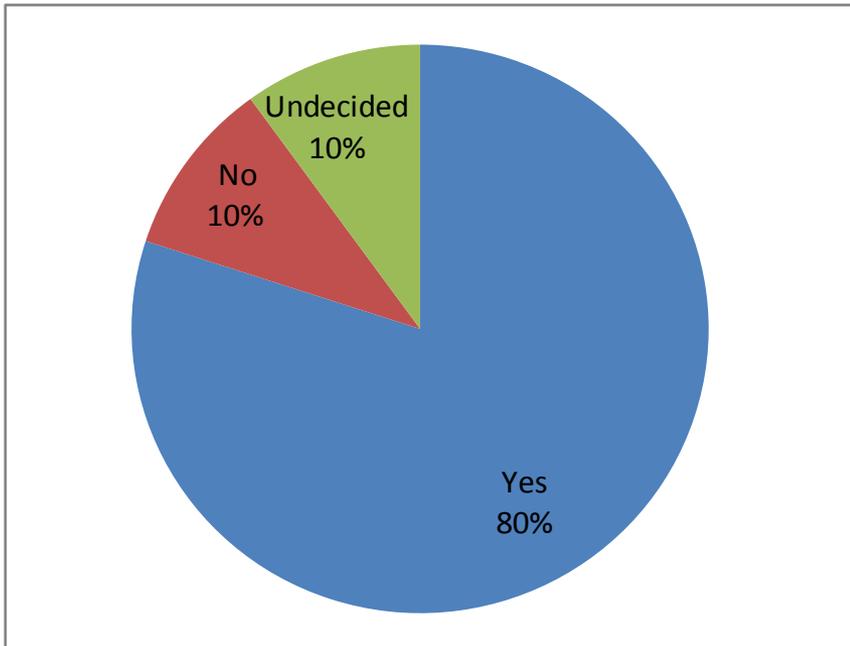
Industry Responses to Questions



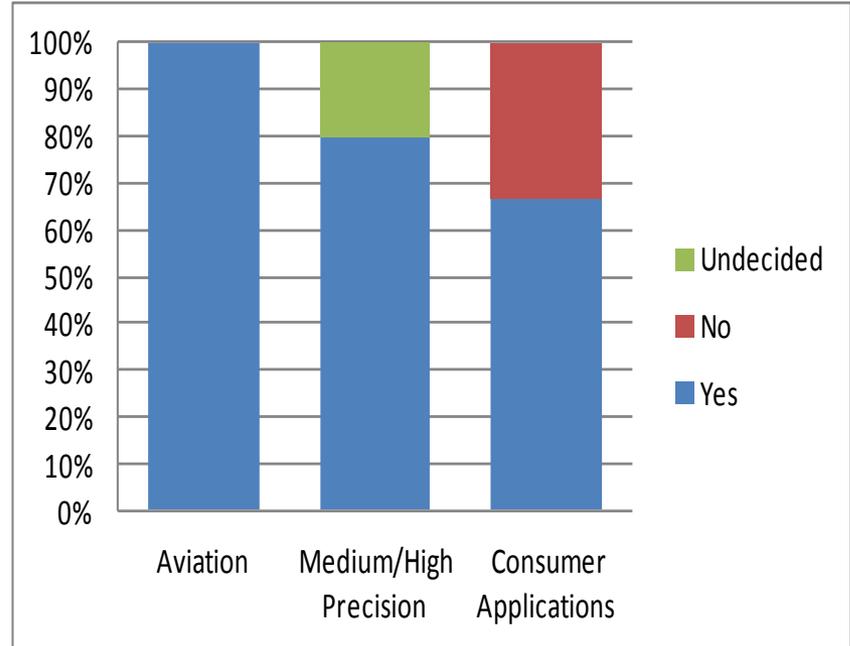
Question #15:

Does a wider satellite transmitter bandwidth help with multipath mitigation?

Overall Response*



Response Breakdown by Sector



*10 Total Responses to the Question



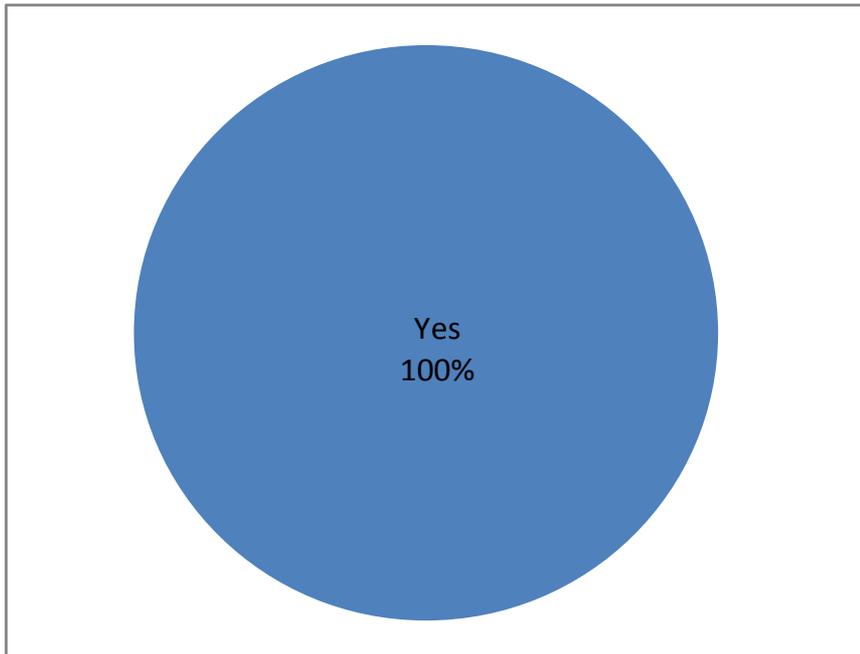
Industry Responses to Questions



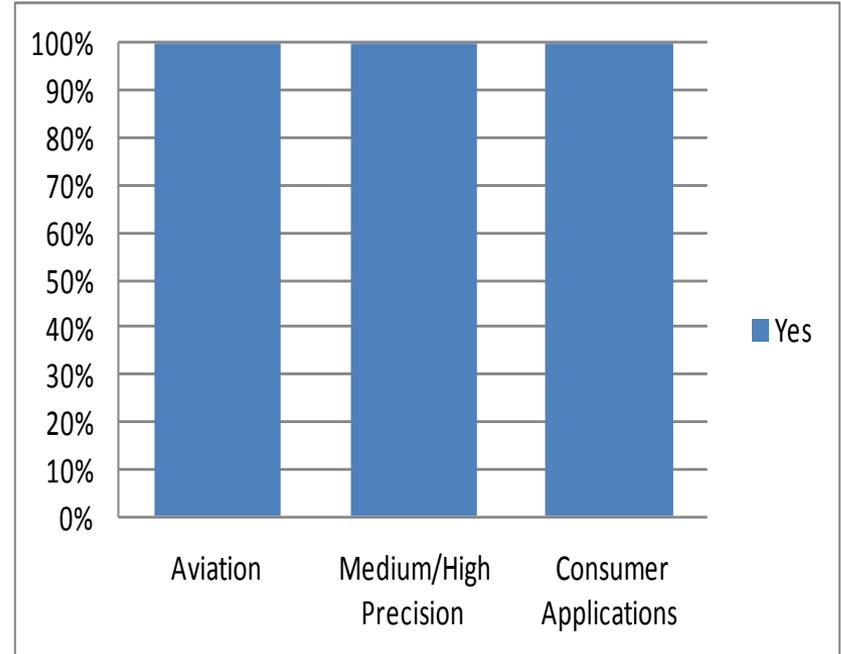
Question #16:

Would you recommend GNSS or SBAS services provide interoperability parameters?

Overall Response*



Response Breakdown by Sector



*9 Total Responses to the Question



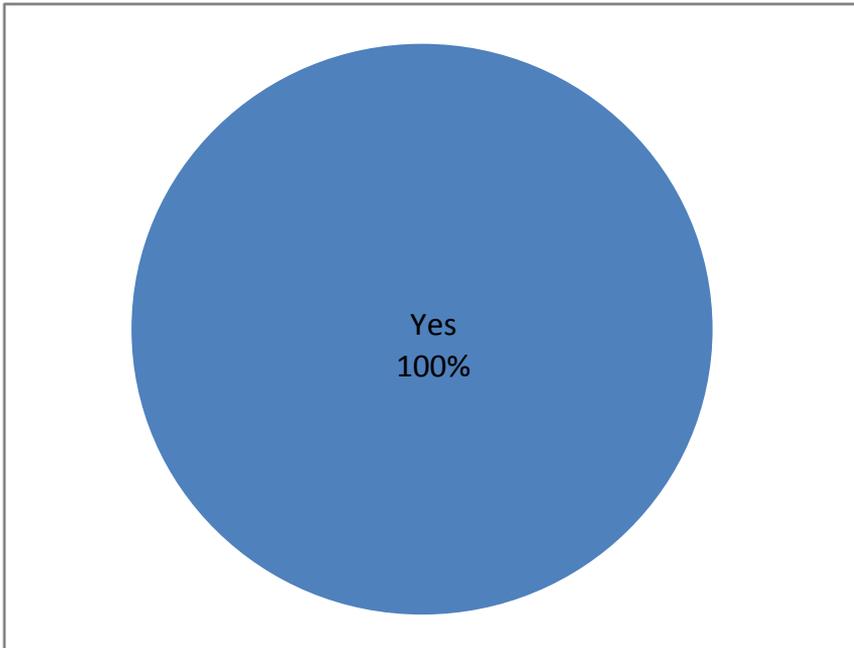
Industry Responses to Questions



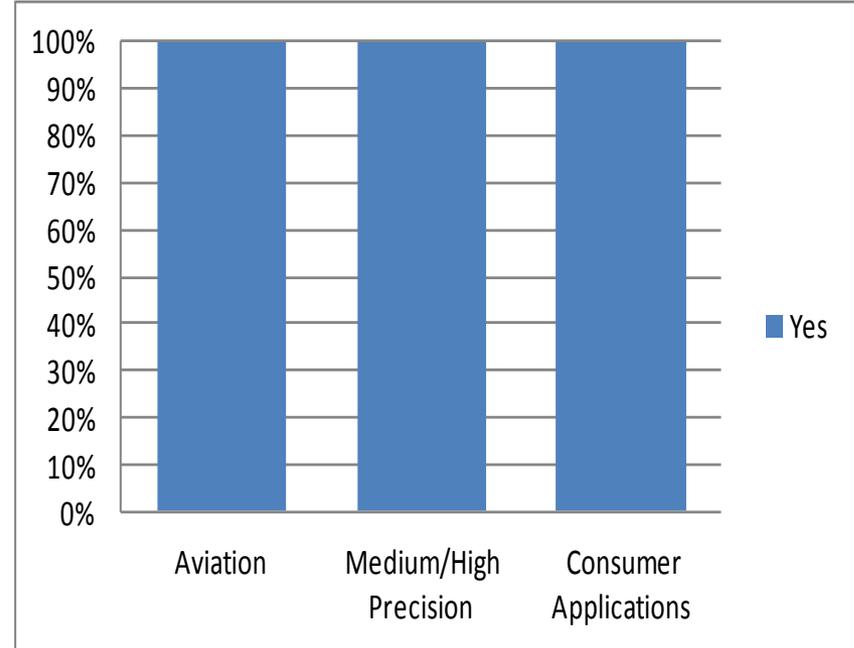
Question #17:

Should the international community strive to protect all GNSS signal bands from terrestrial signal interference?

Overall Response*



Response Breakdown by Sector



*11 Total Responses to the Question



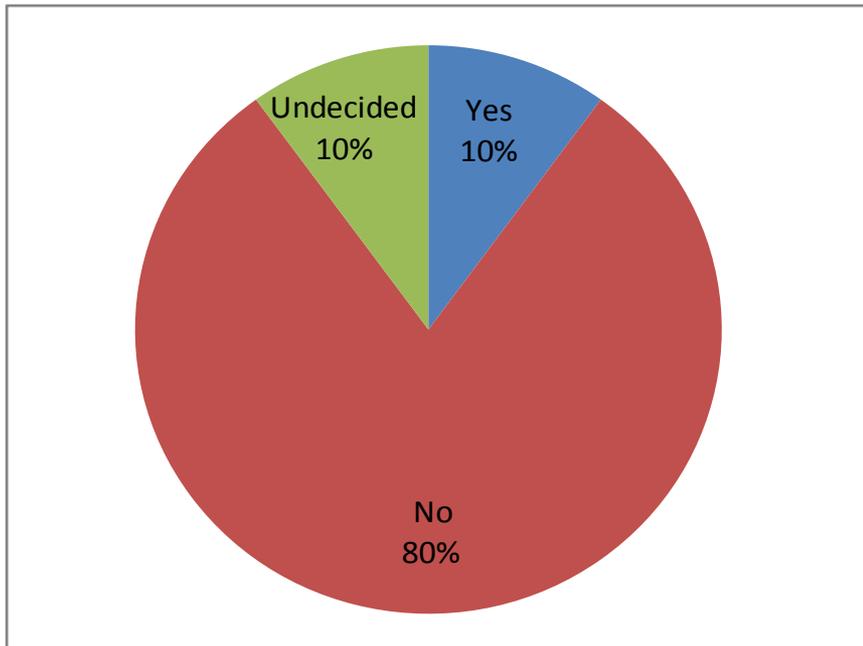
Industry Responses to Questions



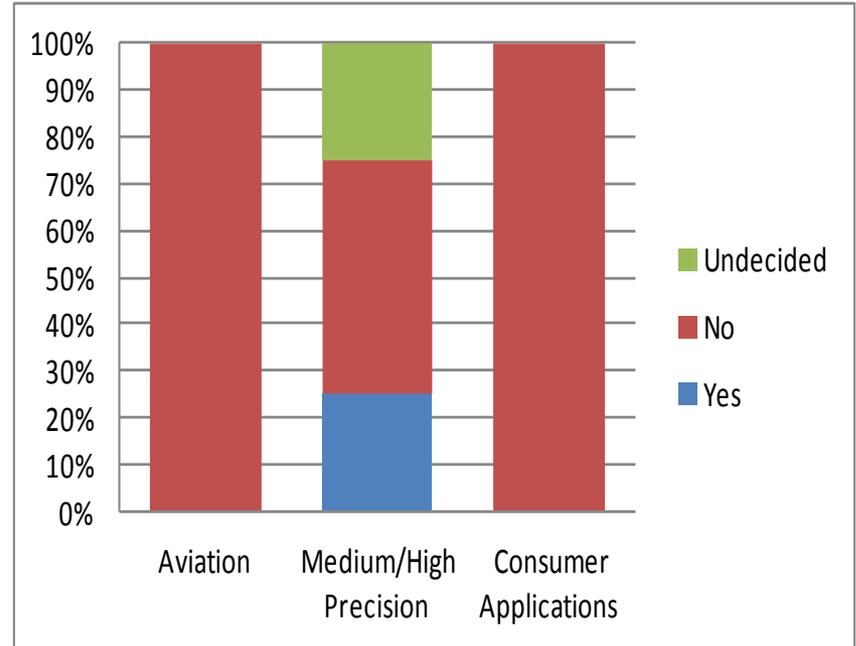
Question #18:

Do the current differences (~10 cm) in Geodesy pose a problem for your users?

Overall Response*



Response Breakdown by Sector



*10 Total Responses to the Question



U.S. Conclusions and Recommendations



- Information is based on a limited number of participants
 - Statistical variations should be considered when interpreting these results
- Results are based on the opinion of experts who represent industry interests
- Each Provider should consider holding their own workshop with results incorporated together
- Each GNSS Provider should carefully evaluate these results and determine what it means to their system