



Report on Resilient PNT Forum IV

20 October 2015, IAIN Prague

Background

The International Association of Institutes of Navigation (IAIN) held its 15th World Congress at the Corinthia Hotel, Prague from 21-24 October 2015. The fourth Forum on Resilient Positioning, Navigation and Timing (PNT) was held from 1600-1800 on 20 October 2015, immediately preceding the Congress in the same venue.

This latest meeting, with about 40 participants, followed three very successful events: at ENC 2014 in Rotterdam, ION ITM 2015 at Dana Point CA. and ENC 2015 in Bordeaux. The motivation for these events has been the increasing reliance on Global Navigation Satellite Systems in all transport sectors, for timing and other essential infrastructure throughout the World. The inherent vulnerability of GNSS to disruption makes it essential to provide resilient supporting systems, particularly for safety of life and economically critical applications. Robust systems in the presence of interference, with integrity monitoring and authentication, can only be achieved through cooperative efforts by industry, administrations and user groups.

The objective of this fourth Forum was to focus on identifying resilient PNT solutions that support activities across all applications of navigation and timing and formulating an action plan to make them a reality.

Introduction

The President of IAIN welcomed those attending and stressed the importance of the topic of Resilient PNT. Brief statements of support were given on behalf of the other two sponsor organisation: EUGIN and IALA.

Keynote

The keynote address was given by the President of the Resilient Navigation and Timing Foundation. Dana Goward drew attention to the widespread dependence on GPS, its vulnerability to disruption and the potentially disastrous consequences, citing the 2014 GLONASS outage, space weather and increasingly frequent jamming incidents as examples. He then went on to report on the US political situation, with strong support for eLoran as a backup, but an announcement still awaited.

Invited presentations

Contributions followed from other invited speakers. John Pottle described the work carried out by Spirent on detecting and mitigating interference, using simulation. Michael Hoppe gave an update on progress with R-mode, showing good results for accuracy. Nick Ward presented some findings from a recent survey of mariners on GNSS outages, indicating that

such outages were common occurrences, but rarely reported. The need for a backup was overwhelmingly supported by the respondents.

Discussion

There was general agreement that no single solution to resilient PNT would be found. A combination of available systems was the best approach. It was recognised that GNSS receiver standards needed to be improved, to make them less susceptible to interference. Raising awareness about GNSS vulnerability and providing education and training about solutions were still important. The question of who bears the cost of better systems must be faced. It was noted that governments were reluctant to provide new systems and privatised services may be more acceptable.

The message 'Protect, Toughen, Augment' delivered by Brad Parkinson at the first Forum still applies. The option of ADS-B for aviation was mentioned, but it was noted that this currently depends on GNSS for timing. It was suggested that GPS denial should be part of the training of new navigators to increase awareness. One view was that multi-source GNSS could be an adequate solution for some applications, but the common failure modes were recognised.

John Betz asked: 'How resilient does PNT need to be?' Manufacturers could make receivers much more resistant to disruption, but the cost might not be acceptable.

Conclusions

- A multi-system approach is needed
- GNSS receiver standards must be addressed
- There is still a need for education, particularly on reporting outages
- The question of who bears the cost of better systems must be faced

Actions

The coordinator (Nick Ward) would prepare a report for circulation to interested participants for comment.

Closing remarks

Participants were asked whether the event had been useful and if another one should be organised. The response was positive and it is proposed to consider holding another Forum during ENC 2016 in Helsinki.