IALA RECOMMENDATION (NORMATIVE)

R0124 (A-124) APPENDIX 12 CO-LOCATION ISSUES AT AIS PHYSICAL SHORE STATIONS (AIS-PSS) AND ON-SITE INFRASTRUCTURE CONSIDERATIONS

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DOCUMENT REVISION

Revisions to this IALA Document are to be noted in the table prior to the issue of a revised document.

Date	Details	Approval
December 2012	1st issue	
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1 INTRODUCTION

1.1 INDEX OF APPENDICES TO IALA RECOMMENDATION R0124 (A-124) ON THE AIS SERVICE

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Appendix 2	Intentionally blank

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1.2 PURPOSE OF THE APPENDIX

This appendix covers the possibility of an AIS-PSS being co-located with other AIS equipment, or with non-AIS equipment suites which may or may not utilize shared antennas and/or network connectivity.

In the context of the AIS Service, the term "AIS Physical Shore Station (AIS-PSS)" indicates the presence of the AIS components, regardless of any co-located non-AIS capabilities at the same Remote Site. Other shore-based e-Navigation services may also use the term Physical Shore Station within their respective context. Therefore, from a shore-based e-Navigation system point of view, it is possible that there are Physical Shore Stations of different shore-based e-Navigation services at the same Remote Site.

Figure 1 shows the resulting situation at the Remote Site, taking into account the shared use of the on-site framework infrastructure and the common (local) Technical Operation Personnel for all e-Navigation services residing on-site.

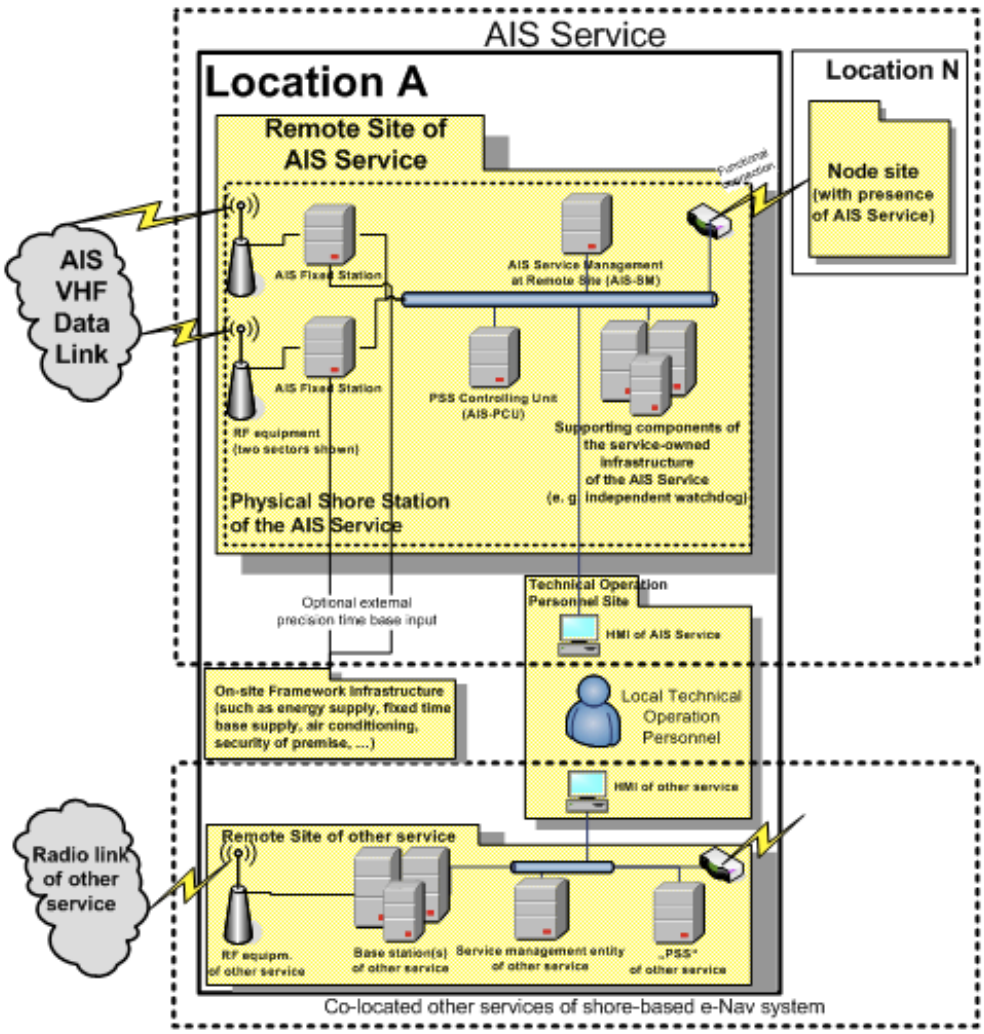

Figure 1 Co-located non-shared assets

2 CO-LOCATION ISSUES AT REMOTE SITES

2.1 ANTENNA LOCATION

Co-located antenna placement is critical when the antennas operate in the same or nearby frequency range(s). Antennas should be separated as much as possible; vertical separation is preferable to horizontal separation. The greater the separation between the transmitting and receiving antennas, the less interference encountered. It is also important to consider antenna placement for AIS with respect to operational performance requirements.

Transceiver power, frequency band, and antenna directivity are all factors when considering antenna placement for multiple transceivers.

The desire to share physical antennas between transceivers is also a possibility. When sharing antennas, proper filtration is recommended (refer to section 2.4).

For dipole antennas, tilting the tops of the transmitting and receiving antennas away from each other can enhance vertically polarized ground wave communications. Tilt angles between 15 and 30 degrees will provide the best results; the best angle is achieved by trial and error. The constraints are best understood and addressed by a team including RF and systems engineering that can specifically weigh the options and arrive at an optimal solution.

2.2 POWER DISTRIBUTION

When co-locating the AIS-PSS with other operational equipment, the following concepts should be considered:

- the total amount of power each piece of equipment could require during normal operations and the impact on other systems power requirements when installing the AIS-PSS;
- whether there is a local power utility, or if the remote site needs to supply its own power;
- the amount of run time required if/when the local power utility or the AIS-PSS power subsystem stops providing power;
- which equipment is critical for normal or reduced operations in the event of power generation/supply; and
- the necessity of heating/cooling/dehumidification in the event of power loss.

All of these concepts impose constraints on finding solutions to potential power issues when co-locating. Typically, it is recommended that critical equipment be placed on a backup power source to make sure there is no loss of functionality during power loss to the AIS-PSS. It is important that all equipment responsible for getting data to and from the AIS-PSS be on a backup power source. The sizing of the backup power source should reflect the equipment it is expected to power, as well as the timeframe that the backup power supply should be expected to carry the power supply load. The time that the backup power source should be expected to supply power for is dependent on the mission of the AIS-PSS, the recovery plan for re-establishing power in the event of loss of power (which includes travel time to the AIS-PSS in the event that travel to the site is required), and plan for potentially moving the load of the site to another AIS-PSS. All of these factors help define the backup power supply.

It is also important to consider potential growth of the AIS-PSS when implementing the power distribution solution.

2.3 NETWORK LOADING

When considering co-locating the AIS-PSS with other equipment it is important to understand the loading that each component will impose on the data network, and size the network transmission material and media appropriately. Network capacity should also take into consideration network loading requirements for maintenance, such as software updates and patching.

2.4 CO-SITE INTERFERENCE MITIGATION

Communication equipment in close quarters can experience severe RF interference issues. This can often result in serious consequences, especially from defence electronics. In this co-site environment, it is difficult to adjust acceptable transmit power, and receive sensitivity to acceptable levels simultaneously. As a result, the receiver may lose weak signals at a critical time.

The most common methods used to mitigate co-site interference are with RF filtering and antenna separation. Consideration should be given to intermodulation products as well.

In instances when common methods are ineffective, another mitigating technique for these issues is the use of a Co-site Interference Mitigation System (CIMS). CIMS combine adaptive interference cancellation with bandpass filtering, and other filtering techniques that allow two or more systems to share the same antenna on adjacent frequencies with manageable signal losses.

2.5 ENVIRONMENTAL

Environmental factors should also be considered when co-locating systems, specifically equipment heat production vs. cooling load. Heat production of each piece of equipment, and collective systems, should be evaluated and calculated for cooling load to ensure sufficient cooling is provided.