Communication Networks

Transport Roads & Maritime Services

Procedural Guideline | **ILC-ITS-TP0-002-G14**

Introduction

This guideline is intended to complement procedure ILC-ITS-TP0-002 which is a generic description of processes for installation of Intelligent Transport System devices and systems.

When working on an installation of Vehicle Detection Systems it is advisable to refer to both documents to provide the minimum installation information required.

Overview of Communications Technologies

Communication Networks are means of relaying information and data among interconnected systems. An example being a Road Weather Information System can be connected via copper cable to transmit data to the Traffic Management Centre (TMC) servers upon detection of a flood.

Roads and Maritime Services employs several interfaces to provide connectivity among the systems:

- Wireless (eg. 3G, 4G, WiFi)
- Copper Cable
- Fibre Optics (comes under Cable communications)

Generally copper/fibre optic cables are preferred over wireless due to the following reasons:

- Dedicated lines may already be available
- Wireless networks can suffer from reception and interference issues which do not affect cable communications.

As an example the M4 employs fibre optics for localised communication, copper cables are also used.

If for a reason cable communications are not possible wireless interface is used, however sometimes neither are available (eg. Remote location), in this instance the project team should refer to the “Alternative Power and Communications for ITS installations” guide for assistance.

When communications infrastructure is being discussed, the equipment employed for these are discussed, such as: routers; switches; firewalls; hubs and etc as well as any other hardware systems that enables communication to take successfully take place.

Selection Considerations for Communications Technologies

Matters to be considered in the selection of the communications technologies to be used for ITS devices include at least the following:

What are the reasons for selecting this communications technology for this specific application?

Each communications technology has strengths and weaknesses.

For example, wireless technologies do not require cabling to be ploughed into the ground but they are potentially more susceptible to varying propagation conditions, geographical factors and to interference. Copper cable is easier to install than optical fibre but in a lightning prone area, optical fibre systems are less vulnerable to damage.

Consideration should also be given to whether a mix of communications technologies may be appropriate in some circumstances. For example the SCATS PAPL Network Replacement Project used four principal communications technologies.

What are the reasons for believing this communications technology will work reliably in this specific application?

Due to each communications technology having its own strengths and weaknesses, what works well in one application may not even work at all in a different application. Indeed nominally identical service from different service providers may provide significantly different performance.

Among factors which need to be considered are the characteristics of the raw data, the availability required of the service, and even the speed with which a connection may be initiated,

Has this communications technology been used in this application before?

If the technology has been used before for this type of application, then its performance needs to be considered. If it has not been used before then trials need to be performed to verify its suitability.

Has the network be appropriately designed to handle the anticipated traffic loads?

Are appropriate installation techniques used?

This includes, but is not limited to such matters as grounding, termination (resistors), drawing and laying of cables etc.

Most cable types have strict handling requirements including minimum bend radius and maximum drawing force. These handling requirements apply not only to optical fibre cable, but also to coaxial cables and to high-speed twisted pair copper cables such as Cat5 and faster.

Are appropriate connector types used?

For example, modular connectors eg RJ45 types, are designed for either stranded conductor cable OR for solid conductor cable, not for both; the correct connector type must be used for that particular cable.

Is the area prone to lightning or other significant electrical transient events?

Appropriate protection devices must be provided *and installed correctly*.

Are the equipment environmental ratings appropriate to the operating environment?

This applies particularly to the temperature rating of communications equipment. For example, equipment intended for office use is generally only rated for operation to 40-45 degrees Celsius

and must not be used in an outdoor enclosure whose interior temperature may reach 70 degrees Celsius.

Operating and Maintenance Manual

The communications equipment operating procedures and maintenance manuals provided by the supplier must be adhered to.

System documentation

The communications network, equipment, connections and configurations used must be documented. This documentation must be kept up to date by revising it whenever changes are made.

References and Related Documents

Related Documents:	
Policies	Nil
Standards and Specifications	• Roads and Maritime Services QA Specification IC-QA-TS020 - ITS Communication Systems • Roads and Maritime Services QA Specification IC-QA- R155 - Design and Construction of Underground Cableway • TSI-SP-003 - Communications Protocol for Roadside Devices
Procedure	• ILC-ITS-TP0-002 ITS Project Life Cycle • Site specific and dependent on the design.
Technical Directions	• TDT 2011/07 Attachment of Equipment to Traffic Facilities Assets • TDT 2012/10 Energy Management for New Traffic Assets • TDT 2012/03 Economic Analysis of Closed Circuit Television Cameras
Guidelines	• ITS-11ITS7 APC Selection Guidelines – Alternative Power and Communications for ITS Installations.
Maintenance Specifications	For Supplier-specific maintenance documents, refer to those provided by Supplier(s).
Factory Acceptance Testing (FAT)	Not applicable

Site Acceptance Testing (SAT)	Not applicable

Acronyms, Abbreviations and Definitions

Term	Definition
ITS	Intelligent Transport Systems
ITSP	Intelligent Transport Systems Projects
TMB	Traffic Management Branch
TMC	Transport Management Centre
WiFi	Technology that enables wireless data exchange between devices

About this release

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Issue	Date	Revision description
Issue 1	July 2013	Initial Release
Issue 2	September 2013	Updated author and technical authority
Issue 3	November 2013	Added link to the “Alternative Power & Communications for ITS Installations” guideline.
Issue 4	March 2015	New Template and logo. Updated References and Related Documents.

Note: The issue date is normally considered to be the date on which a document is authorised or signed off. Under the ILC Management System, authorisation is indicated by the signature of the authorising manager on the document register. For simplicity then, the date of writing or revising a document is used as the issue date.

This document is published under the Infrastructure Life Cycle Management System and is subject to review and continual improvement. The current version of this procedure is that published on the Roads and Maritime Services intranet.

Note: The Infrastructure Lifecycle Management System complies with the requirements of the ISO9001 standard. This standard is revised every four years (2008, 2012, 2016). While system procedures within the ILC Management System are revised as necessary, to meet any changed requirements of the standard, references within the procedures refer only to ISO9001.

It should be confidently assumed by users that the term ISO9001 within a procedure refers to the most current version of the standard.

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