NS 215

Telecommunications
Design – Work Instruction
Allocation and Recording of Fibre Use

November 2011

SUMMARY

Network Standard NS215 specifies the technical requirements for the allocation and recording of usage of optical fibre used throughout the Ausgrid network.

ISSUE

For issue to all Ausgrid and Accredited Service Providers' staff involved in the design, review and approval of the creation and modification of network infrastructure; and supervising or carrying out of works associated with those installations.

Ausgrid maintains a copy of this and other Network Standards together with updates and amendments on www.ausgrid.com.au.

Where this standard is issued as a controlled document replacing an earlier edition, remove and destroy the superseded document.

DISCLAIMER

As Ausgrid's standards are subject to ongoing review, the information contained in this document may be amended by Ausgrid at any time.

It is possible that conflict may exist between standard documents. In this event, the most recent standard shall prevail.

This document has been developed using information available from field and other sources and is suitable for most situations encountered in Ausgrid. Particular conditions, projects or localities may require special or different practices. It is the responsibility of the local manager, supervisor, assured quality contractor and the individuals involved to ensure that a safe system of work is employed and that statutory requirements are met.

Ausgrid disclaims any and all liability to any person or persons for any procedure, process or any other thing done or not done, as a result of this Standard.

Note that compliance with this Network Standard does not automatically satisfy the requirements of a Designer Safety Report. The designer must comply with the provisions of the WHS Regulation 2011 (NSW - Part 6.2 Duties of designer of structure and person who commissions construction work) which requires the designer to provide a written safety report to the person who commissioned the design. This report must be provided to Ausgrid in all instances, including where the design was commissioned by or on behalf of a person who proposes to connect premises to Ausgrid's network, and will form part of the Designer Safety Report which must also be presented to Ausgrid. Further information is provided in Network Standard (NS) 212 *Integrated Support Requirements for Ausgrid Network Assets*.

INTERPRETATION

In the event that any user of this Standard considers that any of its provisions is uncertain, ambiguous or otherwise in need of interpretation, the user should request Ausgrid to clarify the provision. Ausgrid's interpretation shall then apply as though it was included in the Standard, and is final and binding. No correspondence will be entered into with any person disputing the meaning of the provision published in the Standard or the accuracy of Ausgrid's interpretation.

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CONTENTS

1 INTRODUCTION

This Network Standard specifies the method by which optical fibre should be allocated and optical fibre usage should be recorded.

2 DEFINITIONS

FGW	Fibre-optic ground wire (a.k.a. OPGW – “Optical Pilot Ground Wire”)
FOC	Fibre-optic cable (used where composition of cable link between Ausgrid assets is mixed).
FOU	Underground fibre-optic cable
FSS	Self-supporting fibre-optic cable (a.k.a ADSS)
GIS	Geographic Information System
NS	Network Standard
MPLS	Multi-Protocol Label Switching – the hardware networked by optical fibre and used to convey non-protection information from substations (formerly called the Pinc equipment)
PNI	Ausgrid’s GE Energy Smallworld Physical Network Inventory system

3 REFERENCES

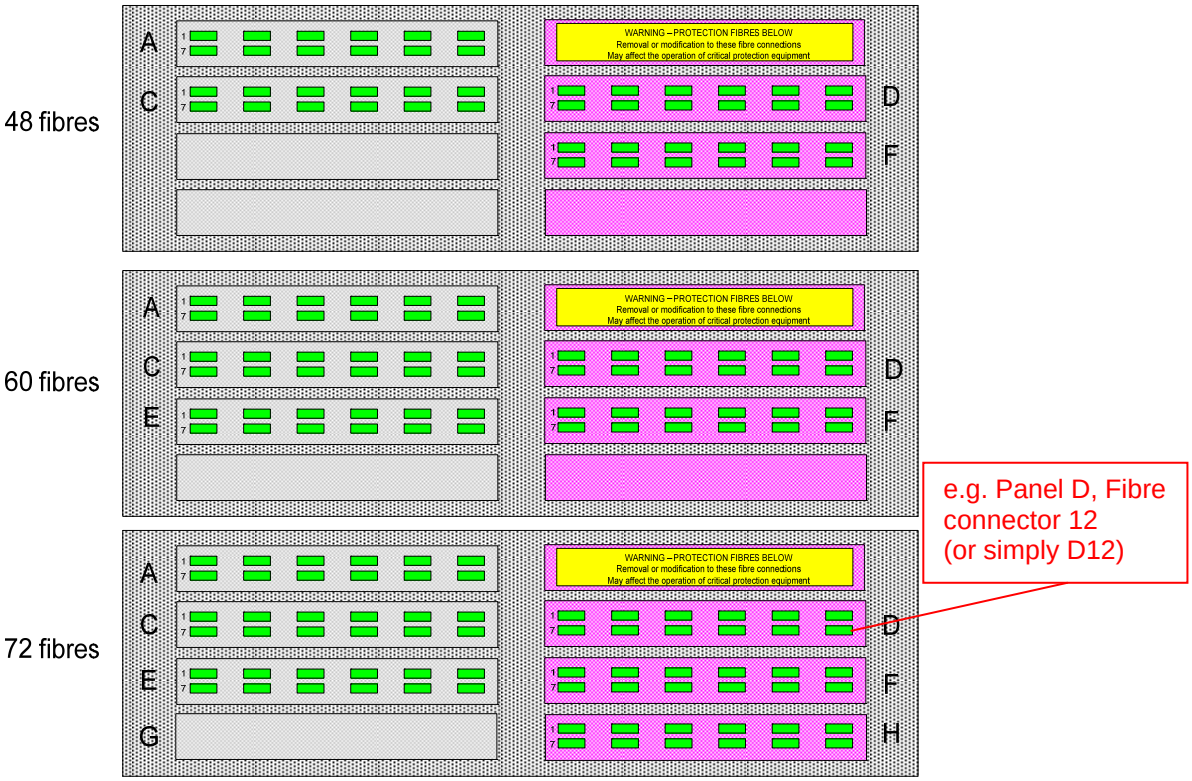
All work covered in this document shall conform to all relevant Legislation, Standards, Codes of Practice and Network Standards including but not limited to:

- NEGTC08.1.1 Telecommunications Dictionary
- NEGTC08.1.2 Telecommunications Reference
- NEGTC12 Telecommunications Site Codes
- NEGTC17 Telecommunications Naming Conventions
- NS203 Planning and Design Standards for Electrical Network Telecommunications Assets. NS203 is gradually being superseded by other standards - where conflicts exist between NS203 and other related Network Standards, the other related Network Standards shall take precedence.
- NS208.2.1 Telecommunications Substation Communications Cabinet Architecture Design Work Instruction
- NS208.2.2 Telecommunications Communication Cabinet Cable Interconnectivity Design Work Instructions
- NS208.2.3 Telecommunications Substation Communication Cabinet Allocations Design Work Instructions

Current Network Standards are also available on Ausgrid’s internet site at www.ausgrid.com.au.

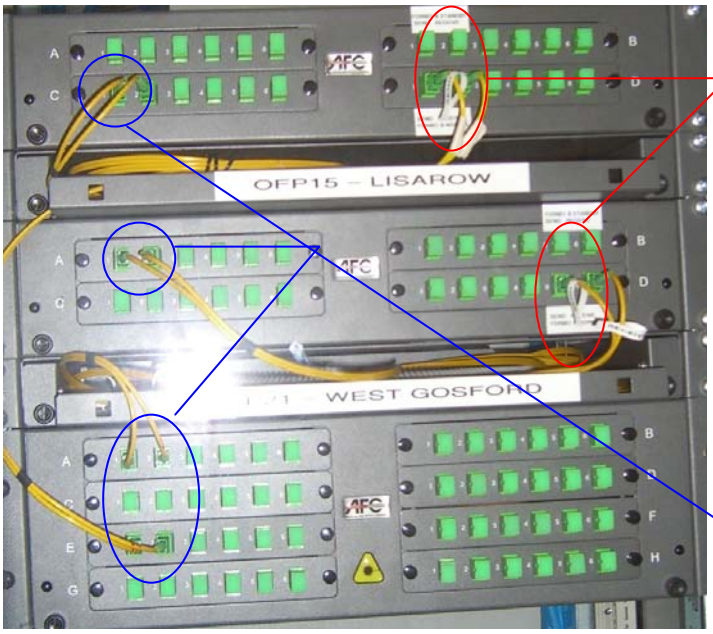
4 BACKGROUND

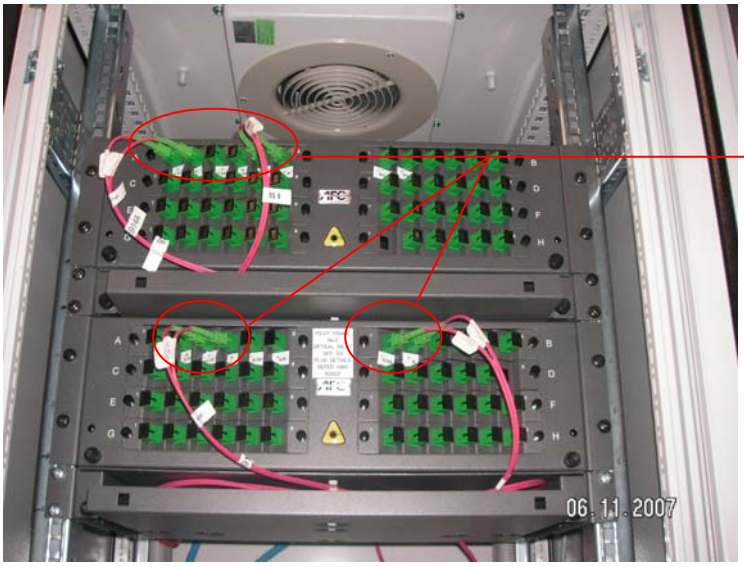
The arrangement of fibre termination panels varies according to the number of fibres in the fibre-optic cable (it also varies for historical reasons). Thus the possible panel arrangements are as follows:



Connectors for optical fibres reserved for power system protection purposes occupy red blocks in the right-hand side of the fibre termination panels and fibre connectors for other uses occupy blocks in the left-hand side.

Fibre-optic cables installed prior to the MPLS network deployment and prior to the generation of NS203 (which specified the position of fibre terminations) were terminated in an ad-hoc manner. Generally, termination fibres reserved for telecontrol/non-protection uses started at one end of the panel and allocation of fibre reserved for power system protection started at the opposite end of the panel as illustrated in the following examples.





For all new work, the initial allocation of optical fibres shall be the responsibility of the manager responsible for design of equipment associated with power system teleprotection communications.

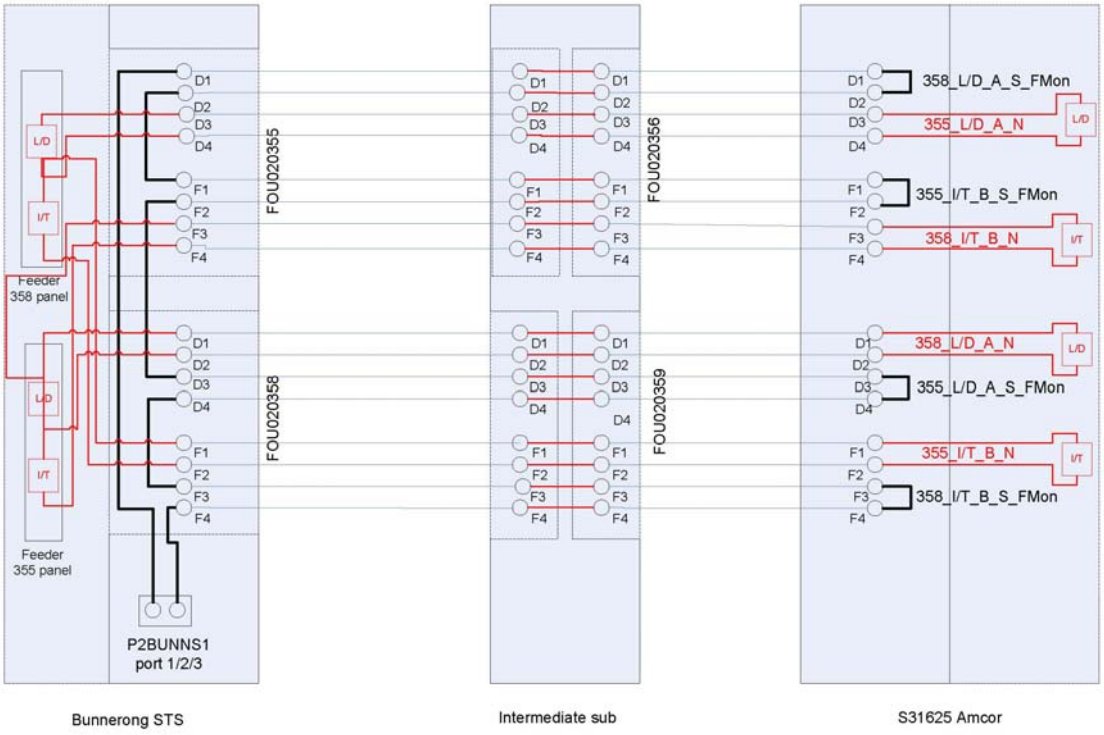
Patching of optical fibres and maintenance of records following reconfiguration due to unplanned outage (i.e. breakdown) shall be the responsibility of the manager responsible for maintenance of the power system protection schemes in the respective region. Staff approved by the Regional Manager responsible for maintenance of the power system protection schemes (generally protection technicians), implement fibre patching and are responsible for ensuring that the PNI Team is informed of changes to connectivity of protection fibres, whilst additional staff approved by the Regional Manager responsible for maintenance of the power system protection schemes (generally telecontrol technicians) implement fibre patching and are responsible for ensuring that the PNI Team is informed of changes to connectivity of fibres used for other purposes.

The PNI Team, Standards & Communications, Design & Engineering, T&SO are responsible for ensuring that fibre connectivity is recorded in PNI, and that up-to-date Fibre Allocation Reports from PNI are kept in BALIN.

Fibre patchcords for protection use shall be as follows.

- At end locations:
  - Red dual fibre (duplex) patchcords shall be used to connect protection relays to the active fibre path.
  - Black simplex (simplex) patchcords shall be used to connect the designated MPLS switch port to the stand-by fibres being monitored and any inter-fibre looping.
- At intermediate locations:
  - Red dual fibre (duplex) patchcords shall be used to connect all normal and standby paths.

This is illustrated in the following diagram:



5 RECORDING FIBRE UTILISATION

5.1 Fibre Allocation Reports

Fibre allocation records shall be managed centrally by the PNI Team. The PNI Team ensures that records of fibre connectivity are kept up to date in the PNI System and that current versions of Fibre Allocation Reports from the PNI system, for each communications site are kept in Ausgrid's BALIN system (see "Fibre Allocation Sheets" on the PNI Index page of BALIN).

It is ESSENTIAL that PNI records and Fibre Allocation Reports are kept up-to-date and to facilitate this the PNI Team MUST be informed of any changes to fibre connectivity as soon as practicable after the change has taken place.

A typical example of a Fibre Allocation Report is shown in Appendix 1.

The colour conventions defined in Appendix 2, and the naming conventions defined in NEG-TC17 -Telecommunications Naming Conventions shall apply.

The typical process for updating fibre allocation reports is described in Section 5.3 and the diagram shown in Appendix 3 below.

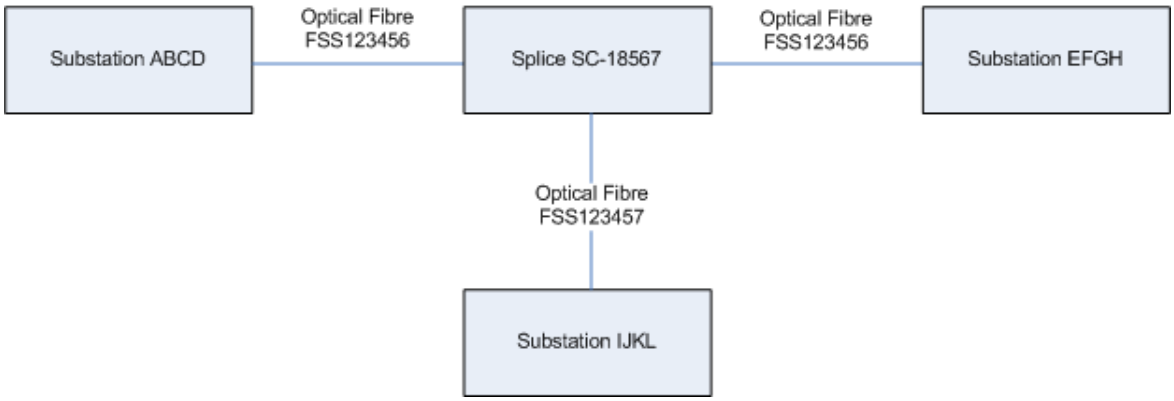
5.2 Optical Fibre Cables, Splices & Additions

A 'straight through' optical fibre cable will be recorded in PNI. Copies of Fibre Allocation Reports for the cable will be located in BALIN with paper copies in the substation at each end,

Information regarding the individual optical fibre core allocations shall be shown in Fibre Allocation Reports as follows:

Site Name	Cable Name	Usage & Core Allocation
Substation ABCD	FSS123456	between Substation ABCD and Substation EFGH
Substation EFGH	FSS123456	between Substation EFGH and Substation ABCD

The subsequent installation of a 'tee' splice somewhere along the fibre cable discussed above (e.g. on pole 18567 for the purposes of connection to a new substation IJKL) shall be managed as follows.



The existing optical fibre cable on both sides of the splice would retain it's existing number. The new 'tee' fibre cable is allocated a new number e.g. FSS123457, and information regarding the individual optical fibre core allocations shall be recorded in PNI and shown in Fibre Allocation Reports as follows:

Site Name	Cable Name	Usage & Core Allocation
Substation ABCD	FSS123456	between Substation ABCD and SC-18567
Substation EFGH	FSS123456	between Substation EFGH and SC-18567
Substation IJKL	FSS123457	between Substation IJKL and SC-18567

Note: there are no Fibre Allocation Reports for splices. Instead, Splicing Diagrams are provided for each splice and these show which cores of which cable are spliced to which other cores of which other cables. PNI has direct links to the current versions of the Splicing Diagrams. Therefore the preparation of a Splicing Diagram is an essential part of the installation of a tee splice.

5.3 Responsibilities

5.3.1 The Group Responsible for Design of Substation communications Equipment

The group responsible for design of substation communications equipment is responsible for:

- design of substation communications equipment associated with power system teleprotection
- the entry into PNI of all fibre allocations for individual projects
- generation of service diagrams and other deliverables
- circulation of deliverables to the appropriate Superintendent responsible for installation of the protection systems
- receiving the redlined records from staff responsible for construction and maintenance of the power system protection systems and amendment of all design records (including service diagram and fibre allocation records in PNI) to reflect the changes in a timely manner.

5.3.2 Staff Responsible for Construction and Maintenance of the Power System Protection Systems

Staff responsible for the construction and maintenance of the power system protection systems are responsible for:

- advising the group responsible for design of equipment associated with power system teleprotection communications of variations of fibre allocations from the design deliverables because of design errors, unforeseen events or breakdowns or failures, in the form of marked up (redlined) documents.
- maintaining two copies of the latest version of the relevant Fibre Allocation Report(s) in a folder at each site. The folder shall be kept in the MPLS cabinet drawer (located at the bottom of the cabinet – refer NS208.2.1 - Telecommunications Communications Cabinet Architecture Design Work Instruction.
- should unplanned changes be required, the two copies in the site folder shall be marked by hand and/or highlighted, in a legible manner, so that the changes are obvious, and one of these copies shall be delivered no later than by the end of the shift to the appropriate Field Coordinator for:
    - immediate forwarding to the PNI Team (by emailing a scanned copy) to update PNI Records. The PNI team email address is: pni@ausgrid.com.au,
    - Acquiring amended Fibre Allocation Reports from BALIN and/or the PNI Team,
    - deployment of two printed copies of the amended Reports to the relevant site by the end of the next business day.

5.3.3 PNI Team

The team responsible for PNI administration is responsible for:

- ensuring that records of fibre connectivity are kept up to date within the PNI System based on information provided from staff responsible for the construction and maintenance of the power system protection systems,
- ensuring current versions of Fibre Allocation Reports from the PNI system, for each communications site are kept in Ausgrid's BALIN system (see "Fibre Allocation Sheets" on the PNI Index page of BALIN),
- following an alteration to a Fibre Allocation Report, arrange for the relevant Field Coordinator -Telecontrol or the Field Coordinator – Protection, as the case may be, to be notified and/or for copies of the updated Fibre Allocation Reports to be sent to for deployment to the relevant sites.
- within one business day of receipt of notification by either the Field Coordinator -Telecontrol or the Field Coordinator – Protection, as the case may be, of unplanned changes to fibre connectivity:
    - amend connectivity records within the PNI system,
    - ensure an updated Fibre Allocation Report is lodged in BALIN,
    - arrange for the relevant Field Coordinator -Telecontrol or the Field Coordinator – Protection, as the case may be, to be notified that the revised Fibre Allocation Report is available on BALIN and/or for copies of the updated Fibre Allocation Reports to be sent, for deployment to the relevant sites.

5.3.4 The Operational Technology Centre

The group for managing the Operational Technology Centre (NOC) shall:

- coordinate the allocation of fibres for MPLS, third party leases and security with the group responsible for design of equipment associated with power system teleprotection communications.

Appendix 1 - Sample Fibre Records

The following example is a preliminary version. When PNI report formatting is finalised an updated version will be included as a sample.

Date: 6/01/2009

Page: 1

	LOCATION: TS7140 Bunnerong				Connected To							
Cable	Panel	Fibre	Service	Atten. (dB)	Cable/Switch/ Relay	Panel/Port	Fibre	Direction	Patch type	Comments	Entered By	Date
FSS020012 (Bunnerong STS - Matraville Zn)	A	1	P4SURRS1-P4BUNNS1_A		P4BUNNS1	3	1	P4SURRS1->P4BUNNS1	SCA-LC (SM)		R Knox	1/10/2007
		2	P4SURRS1-P4BUNNS1_B		P4BUNNS1	3	2	P4SURRS1<-P4BUNNS1				
		3	P1MASCZ1-P4BUNNS1_A		P4BUNNS1	2	1	P1MASCZ1->P4BUNNS1	SCA-LC (SM)		R Knox	1/10/2007
		4	P1MASCZ1-P4BUNNS1_B		P4BUNNS1	2	2	P1MASCZ1<-P4BUNNS1				
		5	P1MASCZ1-P2BUNNS1_A		P2BUNNS1	1/6/2	2	P1MASCZ1->P2BUNNS1	SCA-LC (SM)		R Knox	1/10/2007
		6	P1MASCZ1-P2BUNNS1_B		P2BUNNS1	1/6/2	1	P1MASCZ1<-P2BUNNS1				
		7	P4BUNNS1-P2MATRZ1_A		P4BUNNS1	5	1	P4BUNNS1->P2MATRZ1	SCA-LC (SM)		R Knox	1/10/2007
		8	P4BUNNS1-P2MATRZ1_B		P4BUNNS1	5	2	P4BUNNS1<-P2MATRZ1				
		9	P4BUNNS1-P2KINGZ1_A		P4BUNNS1	1/1/9	1	P4BUNNS1->P2KINGZ1	SCA-LC (SM)		R Knox	1/10/2007
		10	P4BUNNS1-P2KINGZ1_B		P4BUNNS1	1/1/9	2	P4BUNNS1<-P2KINGZ1				
		11	P4BUNNS1-P2ZETLO2_A		P4BUNNS1	1/1/6	1	P4BUNNS1->P2ZETLO2	SCA-LC (SM)		R Knox	1/10/2007
		12	P4BUNNS1-P2ZETLO2_B		P4BUNNS1	1/1/6	2	P4BUNNS1<-P2ZETLO2				
	C	1										
		2										
		3										
		4										
		5										
		6										
		7										
		8										
		9										
		10										
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	D	1										
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		7										
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		12										
	E	1										
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		12										

Date: 6/01/2009

Page: 2

Cable	LOCATION: TS7140 Bunnerong			Atten. (dB)	Connected To					Comments	Entered By	Date
	Panel	Fibre	Service		Cable/Switch/ Relay	Panel/Port	Fibre	Direction	Patch type			
FSS020102 (Bunnerong STS - Botany Zn)	A	1	P4BUNNS1-P2BOTAZ1_A		P4BUNNS1	10	1	P4BUNNS1->P2BOTAZ1	SCA-LC (SM)		T Tipevski	15/11/2007
		2	P4BUNNS1-P2BOTAZ1_B		P4BUNNS1	10	2	P4BUNNS1<-P2BOTAZ1				
		3										
		4										
		5										
		6										
		7										
		8										
		9										
		10										
		11										
		12										
	C	1										
		2										
		3										
		4										
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		6										
		7										
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		10										
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	D	1										
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		10										
		11										
		12										

Bunnerong

Cable	LOCATION: TS7140 Bunnerong Panel	Fibre	Service	Atten. (dB)	Connected To Cable/Switch/ Relay	Panel/Port	Fibre	Direction	Patch type	Comments	Entered By	Date
FOU020355 (Bunnerong STS - S35261 AMCOR Botany Road)	A	1										
		2										
		3										
		4										
		5										
		6										
		7										
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		9										
		10										
		11										
		12										
	D	1	358_L/D_A_S_x		P2BUNNS1	1/2/3	Tx	BUNN>S35261	SCA - SCA (SM)	Terminated at S35261 AMCOR BOTANY ROAD	M Huszar	25/06/2008
		2	358_L/D_A_S_y		FOU020355	F1	Rx	BUNN<S35261	SCA - SCA (SM)			
		3	355_L/D_A_N_x		L/D	355	Tx	BUNN>S35261	SCA - LC (SM)		M Huszar	25/06/2008
		4	355_L/D_A_N_y				Rx	BUNN<S35261				
		5										
		6										
		7										
		8										
		9										
		10										
		11										
		12										
	E	1										
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		8										
		9										
		10										
		11										
		12										
	F	1	355_I/T_B_S_x		FOU020355	D2	Tx	BUNN>S35261	SCA - SCA (SM)	Terminated at S35261 AMCOR BOTANY ROAD	M Huszar	25/06/2008
		2	355_I/T_B_S_y		FOU020358	D3	Rx	BUNN<S35261	SCA - SCA (SM)			
		3	358_I/T_B_N_x	15	I/T	358	Tx	BUNN>S35261	SCA - ST (SM)		M Huszar	25/06/2008
		4	358_I/T_B_N_y	15			Rx	BUNN<S35261				
		5										
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Date: 12/01/2009

Page: 4

FOU020358 (Bunnerong STS - S35261 AMCOR Botany Road)

Cable	LOCATION: TS7140 Bunnerong			Atten. (dB)	Connected To					Comments	Entered By	Date
	Panel	Fibre	Service		Cable/Switch/ Relay	Panel/Port	Fibre	Direction	Patch type			
	A	1										
		2										
		3										
		4										
		5										
		6										
		7										
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		9										
		10										
		11										
		12										
	D	1	358_L/D_A_N_x	15	L/D	358	Tx	BUNN>S35261	SCA - LC (SM)	Terminated at S35261 AMCOR BOTANY ROAD	M Huszar	25/06/2008
		2	358_L/D_A_N_y	15			Rx	BUNN<S35261				
		3	355_L/D_A_S_x		FOU020355	F2	Tx	BUNN>S35261	SCA - SCA (SM)		M Huszar	25/06/2008
		4	355_L/D_A_S_y		FOU020358	F3	Rx	BUNN<S35261	SCA - SCA (SM)			
		5										
		6										
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		11										
		12										
	F	1	355_I/T_B_N_x		I/T	355	Tx	BUNN>S35261	SCA - ST (SM)	Terminated at S35261 AMCOR BOTANY ROAD	M Huszar	25/06/2008
		2	355_I/T_B_N_y				Rx	BUNN<S35261				
		3	358_I/T_B_S_x		FOU020358	D4	Tx	BUNN>S35261	SCA - SCA (SM)		M Huszar	25/06/2008
		4	358_I/T_B_S_y		P2BUNNS1	1/2/3	Rx	BUNN<S35261	SCA - SCA (SM)			
		5										
		6										
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Bunnerong

					Connected To							
Switch	Port	Fibre	Service	Atten. (dB)	Cable/Switch/ Relay	Panel/Port	Fibre	Direction	Patch type	SFP	Entered By	Date
P4BUNNS1	1/1/1	1										
		2										
	1/1/2	1	P1MASCZ1-P4BUNNS1_A		FSS020012	A	3	P1MASCZ1->P4BUNNS1	SCA-LC (SM)	LX	M Huszar	15/02/2008
		2	P1MASCZ1-P4BUNNS1_B			A	4	P1MASCZ1<-P4BUNNS1				
	1/1/3	1	P4SURRS1-P4BUNNS1_A		FSS020012	A	1	P4SURRS1->P4BUNNS1	SCA-LC (SM)	EX	M Huszar	15/02/2008
		2	P4SURRS1-P4BUNNS1_B			A	2	P4SURRS1<-P4BUNNS1				
	1/1/4	1	P4BUNNS1-P2BUNNS1_A		P2BUNNS1	1/6/1	1	P4BUNNS1->P2BUNNS1	LC-LC (MM)	SX	M Huszar	15/02/2008
		2	P4BUNNS1-P2BUNNS1_B			1/6/1	2	P4BUNNS1<-P2BUNNS1				
	1/1/5	1	P4BUNNS1-P2MATRZ1_A		FSS020012	A	7	P4BUNNS1->P2MATRZ1	SCA-LC (SM)	LX	M Huszar	15/02/2008
		2	P4BUNNS1-P2MATRZ1_B			A	8	P4BUNNS1<-P2MATRZ1				
	1/1/6	1	P4BUNNS1-P2ZETLO2_A		FSS020012	A	11	P4BUNNS1->P2ZETLO2	SCA-LC (SM)	EX	M Huszar	15/02/2008
		2	P4BUNNS1-P2ZETLO2_B			A	12	P4BUNNS1<-P2ZETLO2				
	1/1/7	1										
		2										
	1/1/8	1										
		2										
	1/1/9	1	P4BUNNS1-P2KINGZ1_A		FSS020012	A	9	P4BUNNS1->P2KINGZ1	SCA-LC (SM)	LX	M Huszar	15/02/2008
		2	P4BUNNS1-P2KINGZ1_B			A	10	P4BUNNS1<-P2KINGZ1				
	1/1/10	1	P4BUNNS1-P2BOTAZ1_A		FSS020102	A	1	P4BUNNS1->P2BOTAZ1	SCA-LC (SM)	LX	M Huszar	15/02/2008
		2	P4BUNNS1-P2BOTAZ1_B			A	2	P4BUNNS1<-P2BOTAZ1				
	1/2/1	1										
		2										
	1/2/2	1										
		2										
	1/2/3	1										
		2										
	1/2/4	1										
		2										
	1/2/5	1										
		2										
	1/2/6	1										
		2										
	1/2/7	1										
		2										
	1/2/8	1										
		2										
	1/2/9	1										
		2										
	1/2/10	1										
		2										

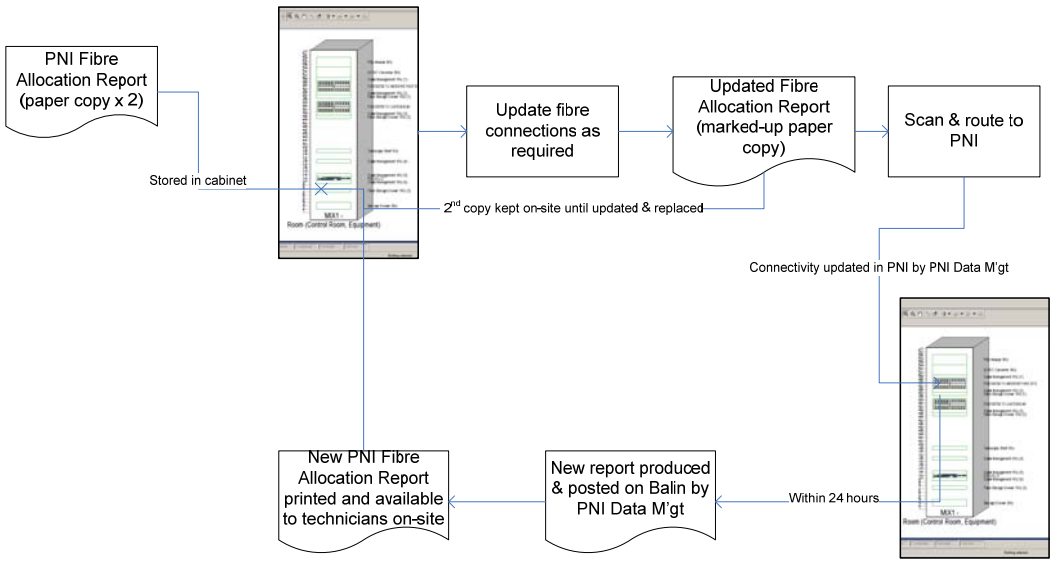
					Connected To							
Switch	Port	Fibre	Service	Atten. (dB)	Cable/Switch/ Relay	Panel/Port	Fibre	Direction	Patch type	SFP	Entered By	Date
P2BUNNS1	1/6/1	1	P4BUNNS1-P2BUNNS1_A		P4BUNNS1	1/1/4	2	P4BUNNS1->P2BUNNS1	LC-LC (MM)	SX	M Huszar	15/02/2008
		2	P4BUNNS1-P2BUNNS1_B			1/1/4	1	P4BUNNS1<-P2BUNNS1				
	1/6/2	1	P1MASCZ1-P2BUNNS1_A		FSS020012	A	6	P1MASCZ1->P2BUNNS1	SCA-LC (SM)	LX	M Huszar	15/02/2008
		2	P1MASCZ1-P2BUNNS1_B			A	5	P1MASCZ1<-P2BUNNS1				
	1/2/1	1	PN-MD3311/1		MD3311/1	FIBRE ETHERNET	2	DNMS->BUNNS_MD3311/1	LC-MTRJ (MM)	FX	M Huszar	15/02/2008
		2	(Bunnerong, APM & Randwick)				1	DNMS<-BUNNS_MD3311/1				
	1/2/2	1	PN-MD3311/2		MD3311/2	FIBRE ETHERNET	2	DNMS->BUNNS_MD3311/2	LC-MTRJ (MM)	FX	M Huszar	15/02/2008
		2	(Sydney Airport, SAC & Botany)				1	DNMS<-BUNNS_MD3311/2				
		1	BUNN-S35261_S fibre monitoring		FOU020355	D	1	BUNN>S35261	LC-LC (SM)	FX-SM	R Knox	5/01/2009
		2	BUNN-S35261_S fibre monitoring		FOU020358	F	4	BUNN<S35261	LC-LC (SM)			
		3										
		4										
		5										
		6										
		7										
		8										
		9										
		10										
		1										
		2										

Appendix 2 - Colour Conventions

Entries in the Fibre Allocation Reports shall be recorded in colour with the following conventions:

Colour Convention	Description
Black characters not within **Red** border	Non-protection fibres - allocated and in use
Blue characters not within **Red** border	Non-protection fibres - allocated/reserved for known future use (and possibly patched ready for use)
Black characters within **Red** border	Protection fibres – allocated and in-service
Blue characters within **Red** border	Protection fibres - allocated/reserved for known future use (and possibly patched ready for use)
All other fibres within **Red** border	Reserved for protection system usage

Appendix 3 - Flow Chart of Fibre Allocation Report Update Process



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