

# Technology Discussion Paper

## Field Trial - Fibre

### 1. Objectives

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The execution of a Field Trial for the NBN Co Fibre Infrastructure will meet the following objectives:

- Validation of the design and cost parameters used in the formulation of the Network Cost Model.
- Information on the assumptions used to establish the various Geo-types used in the Network Cost Model.
- Information on the cost differences between aerial and underground fibre deployment in the same geographical area across a number of geo-types.
- Information on the variations that could occur between different organisations providing solutions for the same geographical area across a number of geo-types.
- Comparison between the reference designs and actual solutions for sample areas across a number of geo-types.
- Information on the types of problems that could be expected in the 'real' world in the translation from the reference architecture to a number of sample areas across a number of geo-types.

It would also be extremely advantageous if the implementation activities could be linked to a concurrent Smart Meter trial by an Electricity Distributor, however the current Field Trial plan will be provided as an NBN Co only plan while discussions continue with the Electricity Distributors.

The validation of Product assumptions and utilisation of the Field Trial areas for initial product validation as well as Retail Service Provider involvement will also be considered as a future Stage of the activities.

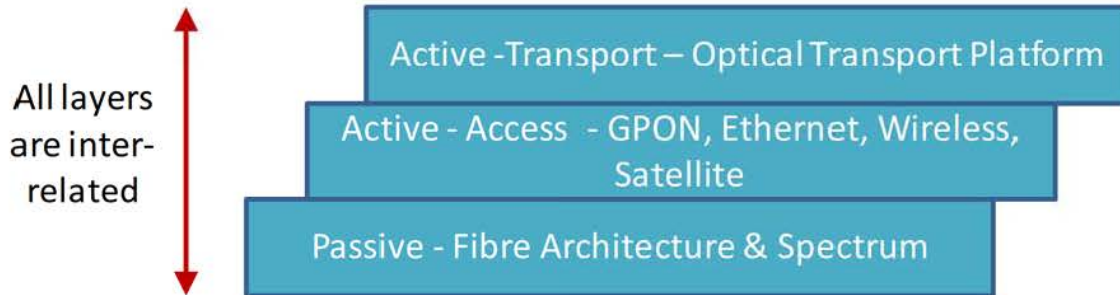
A separate Field Trial proposal will also be generated for the wireless and satellite technologies, with an overlap of one of the geo-type areas chosen for the fibre trial to allow the assessment of the Customer experience across the full suite of NBN Co products.

### 2. Scope

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The Field Trial for the Fibre Infrastructure component is planned to initially cover the Passive fibre infrastructure detailed design, implementation and testing as Stage 1, then continue with the deployment of Active fibre GPON and EtherNet equipment as Stage 2, when the Inter-operability Testing (IoT) activities have concluded in the NBN Co test lab. The provision of a Stage 3 to evaluate the Optical Transport Platform transmission equipment and the delivery of services to RSPs will depend on the finalisation of the NBN Co product structure and the establishment of field trial agreements to connect to Retail Service Providers at specific Points of Interconnect (PoIs).

The overall layered structure of the network can be represented diagrammatically as:



The Field Trial will provide the physical access layer including the provision of fibre which can be used for the Local, Distribution & Trunk segments of the network as Stage 1, the installation of the active access layer equipment in the Fibre Access Node and in Customer premises as Stage 2, concluding with the Product and transport capability to a PoI as Stage 3 (if required).

### 3. Field Trial Areas

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In order to provide the most value possible from the Field Trial a diverse set of locations will be chosen. The intention is to select an area which can provide a challenging design environment to fully examine the boundary conditions of the reference architecture in each of the geo-types.

As there are 12 basic geo-types to select from, the intention is to initially select 5 most relevant to the planning decisions that NBN Co is initially required to make, especially the differences between aerial and underground, with the underground plan also requiring an assessment of the available Telstra duct capacity.

The chosen geo-types are:

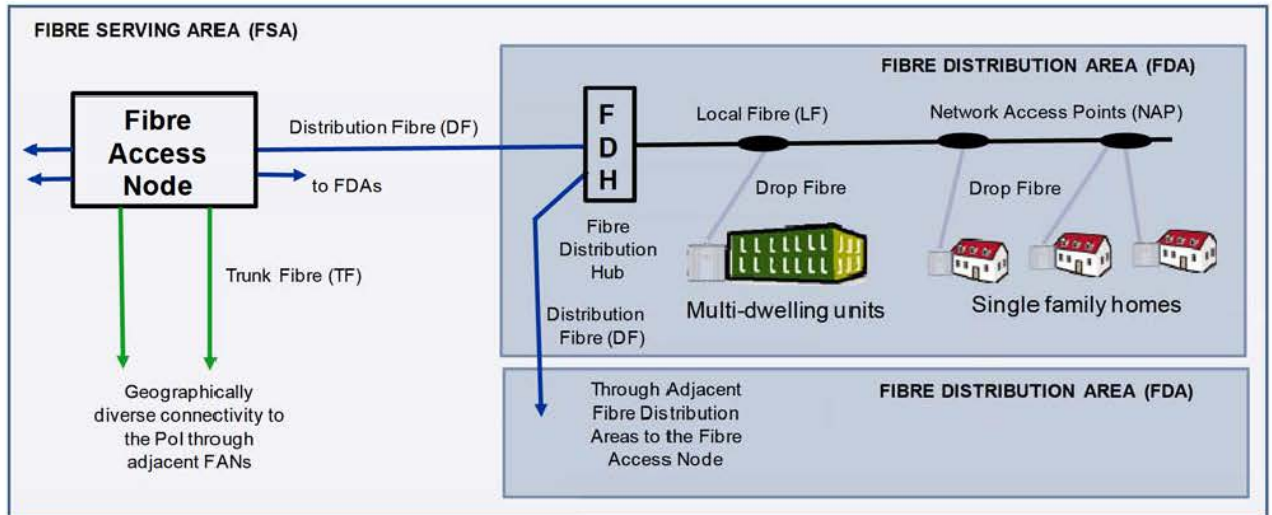
1. Urban Band 2 – Class II 50s (high density terraced type architecture)
2. Urban Band 2 – Class III 60s (suburban, timber fully detached dwellings)
3. Urban Band 3 – Class IV 80s (suburban, brick fully detached dwellings)
4. Major Rural Band 3 – Full township
5. Minor Rural Band 3 – Full Township

The Field Trial will be planned to cover multiple States, to ensure that NBN Co can be seen to be operating as a fully National organisation. The location should be in or close to the capital cities to avoid excess travelling time for all parties. The location should have access to a competitive backhaul provider with minimal additional infrastructure build to allow RSP connectivity to proceed without delay. Examples of these locations from NSW, Victoria, South Australia and Queensland are shown below, final approval of the selected 5 sites will be determined by the NBN Co Executive.

ESA_code	ESA_name	ESA_state	Post Code	ULL Band	Zone	Total GNAFs	Total GNAF in DA	Total GNAF not in DA
<b>1. Urban Band 2 – Class II 50s (high density terraced type architecture)</b>								
WAVE	WAVERLEY	NSW	2022	2	URBAN	21345	21340	5
REDF	REDFERN	NSW	2016	2	URBAN	27290	27282	8
SGHL	SPRING HILL	QLD	4000	1	URBAN	9600	9600	0
NWFM	NEW FARM	QLD	4005	2	URBAN	9882	9882	0
BRUK	BRUNSWICK	VIC	3056	2	URBAN	20274	20274	0
RCMD	RICHMOND	VIC	3121	2	URBAN	20583	20583	0
<b>2. Urban Band 2 – Class III 60s (suburban, timber fully detached dwellings)</b>								
GUIL	GUILDFORD	NSW	2161	2	URBAN	16100	16100	0
LERA	LEURA	NSW	2780	2	URBAN	2905	2880	25
AGVE	ASHGROVE	QLD	4060	2	URBAN	8715	8713	2
TNSF	TOWNSVILLE	QLD	4810	2	URBAN	14492	14492	0
HDBG	HEIDELBERG	VIC	3084	2	URBAN	21462	21458	4
BOXL	BOX HILL	VIC	3128	2	URBAN	22485	22481	4
<b>3. Urban Band 3 – Class IV 80s (suburban, brick fully detached dwellings)</b>								
RCHD	RICHMOND	NSW	2753	3	URBAN	5066	5066	0
ADLE	ARMIDALE	NSW	2350	3	URBAN	11216	10160	1056
MOGG	MOGGILL	QLD	4070	3	URBAN	4638	4638	0
GRBK	GREENBANK	QLD	4124	3	URBAN	3919	3919	0
WERE	WERRIBEE	VIC	3030	3	URBAN	22825	22817	8
SUNB	SUNBURY	VIC	3429	3	URBAN	14933	14933	0
<b>4. Major Rural Band 3 – Full township</b>								
KRIG	KARIONG	NSW	2250	3	MAJOR RURAL	2627	2623	4
MINA	MINNAMURRA	NSW	2533	3	MAJOR RURAL	2676	2667	9
WOODY	WOOMBYE	QLD	4559	3	MAJOR RURAL	2084	1547	537
PARK	PARKHURST	QLD	4702	3	MAJOR RURAL	3067	2659	408
BNHD	BARWON HEADS	VIC	3227	3	MAJOR RURAL	2500	2465	35
BERI	BERRI	SA	5343	3	MAJOR RURAL	2293	2293	0
<b>5. Minor Rural Band 3 – Full township</b>								
TATH	TATHRA	NSW	2550	3	MINOR RURAL	1728	1728	0
BANG	BANGALOW	NSW	2479	3	MINOR RURAL	1678	1678	0
WLBA	WOONGOOLBA	QLD	4207	3	MINOR RURAL	1905	1905	0
DEGN	DEERAGUN	QLD	4818	3	MINOR RURAL	1704	1704	0
FLIN	FLINDERS	VIC	3929	3	MINOR RURAL	1276	1276	0
WIGA	WILLUNGA	SA	5172	3	MINOR RURAL	1389	1389	0
LYDH	LYNDOCH	SA	5351	3	MINOR RURAL	1413	1396	17

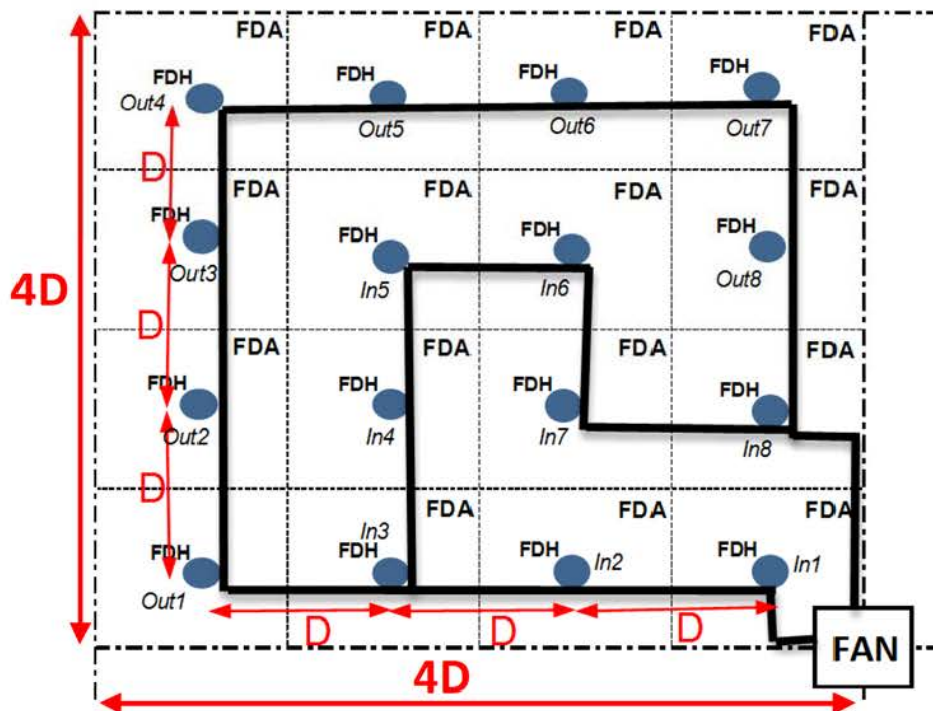
#### 4. Field Trial Fibre Structure

The fibre architecture provides connectivity to each Customer premises via a Drop Fibre to a Network Access Point (NAP), through concentration points within Fibre Distribution Hubs (FDH) in Fibre Distribution Areas (FDA) and Fibre Distribution District (FDD). Each Fibre Access Node is connected to Trunk Fibre to provide backhaul to the Point of Interconnection (PoI) with the Retail Service Providers (RSP) in the nearest practical location.



The Stage 1 plan is to provide a detailed design for a number of Fibre Serving Area Modules (FSAM), where each module will be limited to a maximum of 16 Fibre Distribution Areas (FDAs) which will result in approximately 3,200 premises. The model FSAM shown below will be utilised as the basis for the design, with an inner and outer distribution fibre loop provided to allow the integration of point to point services and minimise the impact of fibre breaks.

### Fibre Serving Area Module



## 5. Field Trial Timing

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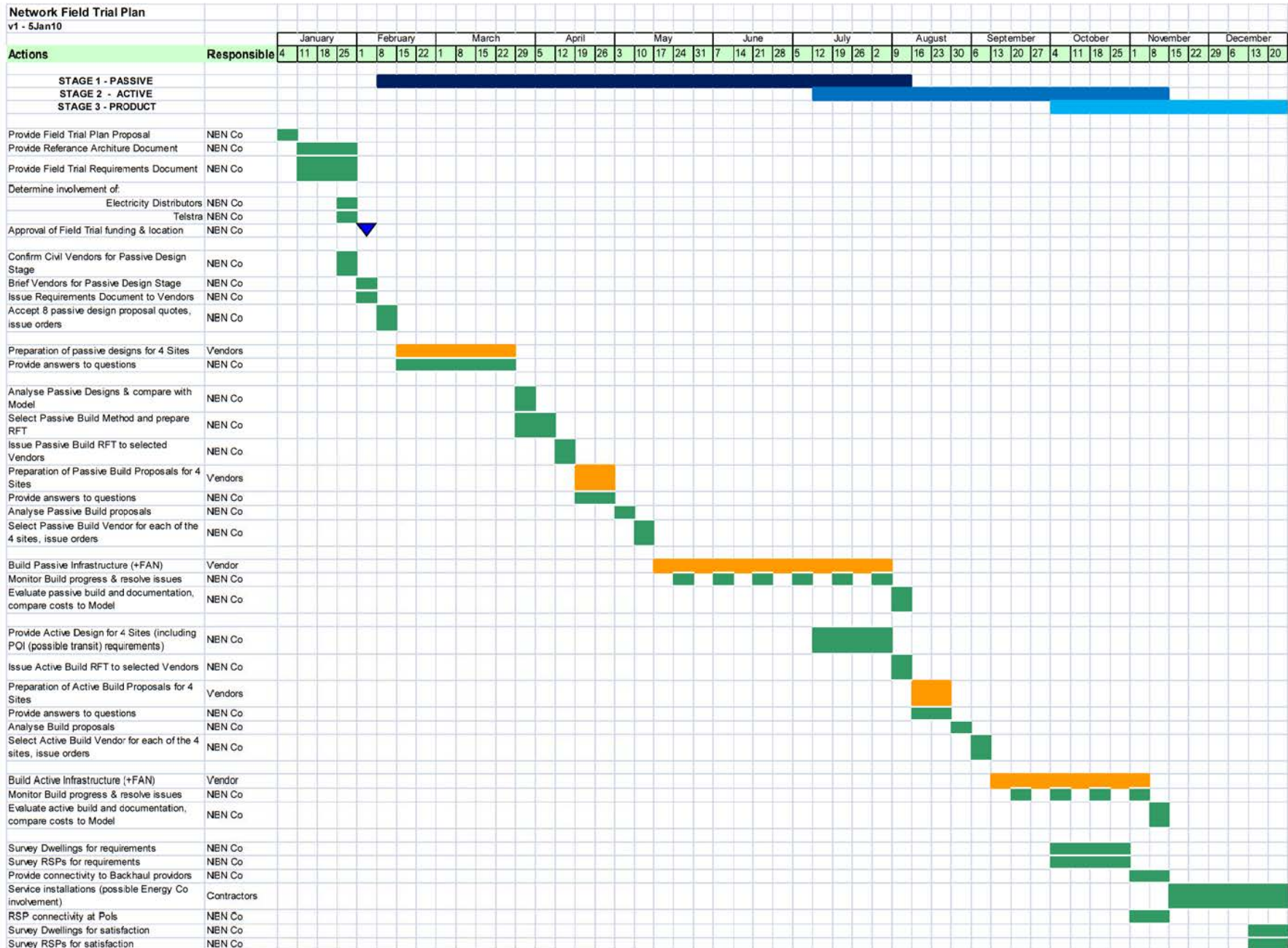
The major stages of the Field Trial have been mapped into the high-level work stream schedule, extracts of the schedule are shown below.

As soon as approval is provided for the Field Trial, a quotation for the design work can be requested from four of the major Australian Telecommunications Civil Works groups. These groups will be informed that this is only a single engagement for a Field Trial design, and that participation is without prejudice for any future NBN Co RFC / RFP activity. The Vendors selected for the actual build activities will not necessarily be the same as the design activity (50% reduction in numbers), however a Vendor is not precluded from providing a proposal to build their design. The major contractors that can be requested to provide a design quotation are:

**Exempt under ss. 7(3A) and 47 of the FOI Act**

This activity is programmed for execution during 2010, however the Contractor design activity will occur in February / March, and build activity will occur between May and July, i.e. 3 months elapsed time. The precursor time is required for NBN Co to release the Design Requirements and the following time for the post analysis review of the detailed design and learning's results.

# NBN Co. Internal



## 6. Field Trial Cost Estimate

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The provision of the initial design is planned to be a separate stand alone activity from any subsequent implementation project, primarily due to the requirement to determine which method (aerial or underground) will be utilised for the fibre build and the need to progress through the RFC and RFP process for the Passive Equipment supply.

For a detailed design activity covering approximately 3,200 addresses over an area of up to 16 square kilometers a significant level of field survey work is required. The Field Trial detailed design is not a desk study, NBN Co will require the provision of detailed drawings which map the existing aerial and underground infrastructure capabilities, and provide actual solutions for any pole replacement / upgrade and duct repair / replacement or bypass required. This extends to the provision of the premises connection as well as the local fibre reticulation. The Fibre Access Node cost and location is also required to be established, which will include the options of Telstra TEBA space as well as new facility provision.

The current assumptions are summarized below, with a detailed chart included as Appendix A.

<b>Field Trial Breakdown:</b>		
<b>Assumptions:</b>		
<b>Rollout:</b>	GNAFs	sq km
Fibre Serving Area Module size (number of Adresses (GNAFs))		
Number of FSAM in Field Trial		
Estimated cost of the Field Trial rollout per address passed including FAN, OLT, ONT and associated links		
Component of costs for Construction/ Passives		
Component of costs for FAN (electronics and commissioning/acceptance)		
	<b>Exempt under ss. 7(3A) and 47 of the FOI Act</b>	
<b>Fibre Access Node costs per trial area:</b>		
Management of the equipment & network, Operations & Billing LAN		
Environmental Management System & alarm monitoring (includes a large component for initial establishment amortised over only 4 FANs)		
FAN Building cost , building or roll in unit (container for example) If TEBA space is leased then a 15 year IRU should be arranged		
Contingency per area for extra cost provisions, maybe council costs, right of access or other		
<b>Design Costs:</b>		
Percentage of Civil Cost for design for each FSAM		
Number of Designs for each FSAM		
Provision for specialist design support/ consultancy for each FSA		
	<b>Field Trial Costs:</b>	
	<b>Design Costs</b>	<b>Each FSA</b>
	<b>Rollout:</b>	<b>Full Trial</b>
	Passives	\$
	Active	\$
	<b>Building costs</b>	\$
	<b>Contingency</b>	\$
	<b>TOTAL COST</b>	\$



## 7. Document Control

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Revision History	Author
0.01	Initial draft.
0.02	Updated timeline and Queensland, Victoria sites added.
0.03	Comparison matrix finalisation

**8. Appendix A: Field Trial Cost Breakdown**

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TBA