



<b>Title:</b> ngVLA Product Tree	<b>Owner:</b> Selina	<b>Date:</b> 2019-08-01
<b>NRAO Doc. #:</b> 020.10.10.05.00-0001-LIS-A-PRODUCT_TREE		<b>Version:</b> A



## ngVLA Product Tree

020.10.10.05.00-0001-LIS-A-PRODUCT\_TREE

Status: **RELEASED**

<b>PREPARED BY</b>	<b>ORGANIZATION</b>	<b>DATE</b>
R. Selina	Electronics Div., NRAO	2019-07-18
R. Treacy	Program Mgmt. Dept., NRAO	2019-07-18

<b>APPROVALS (Name and Signature)</b>	<b>ORGANIZATION</b>	<b>DATE</b>
R. Selina, Project Engineer	Electronics Division, NRAO	2019-08-01
R. Farnsworth, Project Manager	Asst. Director, Program Management, NRAO	2019-08-01
M. McKinnon, Project Director	Asst. Director, NM-Operations, NRAO	2019-08-01

<b>RELEASED BY (Name and Signature)</b>	<b>ORGANIZATION</b>	<b>DATE</b>
M. McKinnon, Project Director	Asst. Director, NM-Operations, NRAO	2019-08-01



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## Change Record

Version	Date	Authors	Affected Section(s)	Reason/Initiation/Remarks
1	2017-05-05	Selina, Treacy	All	Initial Draft based on VLA Product Tree.
2	2017-06-09	Selina, Treacy		Minor edits, distributed to NM Electronics Division for review.
3	2017-06-16	Selina, Treacy		Expanded PSN field one to 3 digits, added another level, deleted '99' designator, cleaned up some comments.
4	2017-07-17	Treacy		Replaced document header, aligned with Ver 1 WBS, removed lots of placeholders.
5	2017-07-17	Selina	Cover, 1, 2, 3, 4	Fixed release block, fixed header. Minor text corrections to make the document more ngVLA centric (than original VLA basis). Corrections for consistency with WBS.
6	2017-07-19	Treacy	all	Introduce gaps in the numbering for expansion, based on Ver 3 of the WBS.
7	2017-08-09	Treacy	several	Removed duplication of narrative and definitions, moved to source documents, added Short Baseline Array to a designation of 020.47, PM Sec 05, SE, Sec 10, Sec 30.05 FE, and Sec 30.10 Cryo.
8	2017-08-28	Treacy	05.50, 05.55, 47.05	Updated to reflect Ver 6 of the WBS.
9	2017-09-08	Treacy	020.22 020.05.60 020.05.60.05	Updated to reflect Ver 7 of the WBS, added Array Calib, Change Mgmt, Change Requests.
10	2017-09-28	Treacy	Multiple sections	Updated to reflect Ver 8 of the WBS.
11	2018-03-28	Treacy	020.25.01 020.30.03	Added 020.25.01 for Antenna optics and 020.30.03 for Integrated Electronics and sub branches, changed previous use of Front End to Receiver (for cartridge level docs).
12	2018-03-29	Treacy	020.60.00	Assigned 020.60.00.00.01 as Array Infrastructure – Existing Facilities.
13	2018-05-14	Treacy	020.05.60	Added branches to accommodate unique folders for each CR.
14	2018-05-17	Treacy	020.21.00 020.05.55	Added branches for Science Communication, StRR.
15	2018-05-29	Treacy	020.10.15.01	Added branch for Stakeholder requirements.
16	2018-06-15	Treacy	020.10.05.05	Added branch for Lifecycle plans.
17	2018-06-26	Treacy	020.40	Reassigned Central Signal Processor to previous branch designation as Correlator; Correlator is now a subsidiary branch to CSP.
18	2018-07-09	Treacy	020.35 020.40	Expanded ngVLA LO sections. Repurposed CSP subsections.



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19	2018-10-01	Treacy	020.05.55 020.30.05 020.30.10	Added Decadal Reviews. Int. 020.05.55.05.02. Ext. 020.05.55.05.03. Moved Dewars to Receiver branch. Added Refrigerators to Cryo branch.
20	2018-10-16	Treacy	Multiple	Attempt to align with BU to WBS mapping 020.05.15.05.00-0002-BUD_WBS; significant mismatches remain, edits following IPDSR, removed WVR 020.45.05, changed to simpler example in Appendix, note IPDSR-159 remains unresolved at this time.
21	2019-03-01	Leff	020.30	Corrected Antenna Electronics summary items that were decomposed too far.
22	2019-07-18	Selina	Multiple	Updated for release with Reference Design (Appendix). Addressed comments from review by M. Stewart. Added clarifying context to sections 1 through 3. Removed extraneous entries that were inconsistent with adopted heuristics.
A	2019-08-01	Lear	All	Prepared PDF for approvals and release.



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## 1 Description

### 1.1 Purpose

This document lists all products to the sub-assembly level incorporated within the ngVLA project.

This hierarchical list of products is the definitive map for assigning ngVLA project product documentation by the Product Structure Number (PSN). The Product Tree is also useful as a guide to organize other ngVLA supporting systems, such as issue tracking or configuration management systems.

This document should be helpful in determining where to place new documents or design artifacts within the product tree structure as well as where to find existing documentation. This is a living document that will be elaborated and updated as the ngVLA progresses through the project lifecycle.

Since the fundamental reason for this document's existence is the control of documents and design artifacts, some additional functional branches are included (e.g., PM, SE, Admin, Safety). Only artifacts which are configuration controlled should be assigned under these branches, and these artifacts are therefore deliverables for development milestones and reviews during the design and construction phase of the project. This differs from the traditional remit of a product breakdown structure, but it permits a single, stable reference for organizing project documentation and design artifacts that is decoupled from the organizational structure or work breakdown structure.

### 1.2 Scope

The scope of this document extends to all ngVLA deliverables. It fully encompasses the ngVLA so that it may be adopted project-wide and grow as the design evolves.

The scope of this document is limited to listing the assigned Product Structure Numbers. The details of documentation management are addressed in AD01, and the overall approach to configuration control is described in AD02.

The ngVLA product tree shall be maintained by Systems Engineering.

## 2 Related Documents and Drawings

### 2.1 Applicable Documents

<b>Doc. #</b>	<b>Document Title</b>	<b>Document Number</b>
AD01	ngVLA Product Documentation Management Plan	020.10.10.10.00-0001-PLA
AD02	ngVLA Configuration Control Plan	020.10.10.15.00-0001-PLA
AD03	ngVLA Work Breakdown Structure	020.05.05.00.00-0001-LIS



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### 3 Product Tree Heuristics

The following rules or heuristics have informed the development of this product tree.

In order to provide capacity to add branches with logical placement, levels 2 and 3 initially skip by increments of five. It is acceptable to insert numbers within these incremental skips to preserve a logical assignment.

The breakdown at the second levels of the product tree shall be aligned with the ngVLA WBS where practical. The third through fifth levels are managed by the relevant group lead or lead engineer as applicable, with guidance from Systems Engineering. The decomposition at the third through fifth level of the tree should always be product/deliverable based.

The ngVLA document number or part number assignments require “fully qualified” part numbers. The definition of fully qualified requires that documents are only assigned at the fifth level of the tree. In cases where a document or artifacts is describing a higher level assembly, the 00 branch designator is reserved to refer to the parent element. E.g., a document or artifact with a PSN of 020.00.00.00.00 refers to the ngVLA project as a whole. These 00 branches have the descriptor “General” in the tree below. Please consult AD01 for further information.

There are TBDs in the Product Tree as placeholders, to demonstrate the pattern of the structure.



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## **4 Product Tree**

### **4.1 020.00 ngVLA Project – General**

#### **020.00.00 ngVLA Project – General**

020.00.00.00 ngVLA Project – General

020.00.00.00.00 ngVLA Project – General

### **4.2 020.05 Project Management and Administration**

#### **020.05.00 Project Management and Administration – General**

020.05.00.00 Project Management and Administration – General

020.05.00.00.00 Project Management and Administration – General

#### **020.05.05 Scope – General**

020.05.05.00 Scope – General

020.05.05.00.00 Scope – General

#### **020.05.10 Schedule – General**

020.05.10.00 Schedule – General

020.05.10.00.00 Schedule – General

#### **020.05.15 Budget – General**

020.05.15.00 Budget – General

020.05.15.00.00 Budget – General

#### **020.05.20 Quality Management – General**

020.05.20.00 Quality Management – General

020.05.20.00.00 Quality Management – General

#### **020.05.25 Human Resources – General**

020.05.25.00 Human Resources – General

020.05.25.00.00 Human Resources – General

#### **020.05.30 Communications – General**

020.05.30.00 Communications – General

020.05.30.00.00 Communications – General

#### **020.05.35 Risk – General**

020.05.35.00 Risk – General

020.05.35.00.00 Risk – General

#### **020.05.40 Procurement – General**

020.05.40.00 Procurement – General

020.05.40.00.00 Procurement – General

#### **020.05.45 Stakeholders – General**

020.05.45.00 Stakeholders – General

020.05.45.00.00 Stakeholders – General



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- 020.05.50 **Community Engagement – General**
  - 020.05.50.00 Community Engagement – General
    - 020.05.50.00.00 Community Engagement – General

- 020.05.55 **Administrative – General**
  - 020.05.55.00 Administrative – General
    - 020.05.55.00.00 Administrative – General
  - 020.05.55.05 Reviews– General
    - 020.05.55.05.00 Reviews – General
      - 020.05.55.05.01 StRR
      - 020.05.55.05.02 Internal Pre-Decadal Submission Review
      - 020.05.55.05.03 External Pre-Decadal Submission Review
  - 020.05.55.10 Proposals – General
    - 020.05.55.10.00 Proposals – General
  - 020.05.55.15 Reports – General
    - 020.05.55.15.00 Reports – General

- 020.05.60 **Change Management – General**
  - 020.05.60.00 Change Management – General
    - 020.05.60.00.00 Change Management – General
    - 020.05.60.01.00 Change Management – 2018 General
      - 020.05.60.01.01 2018 Sequential Entry I
    - 020.05.60.02.00 Change Management – 2019 General

### **4.3 020.10 Systems Engineering**

- 020.10.00 **Systems Engineering – General**
  - 020.10.00.00 Systems Engineering – General
    - 020.10.00.00.00 Systems Engineering – General
- 020.10.05 **Life Cycle Management and Concepts – General**
  - 020.10.05.00 Life Cycle Management and Concepts – General
    - 020.10.05.00.00 Life Cycle Management and Concepts – General
  - 020.10.05.05 Life Cycle Management Plans
    - 020.10.05.05.00 Life Cycle Management Plans
- 020.10.10 **Documentation and Configuration Management – General**
  - 020.10.10.00 Documentation and Configuration Management – General
    - 020.10.10.00.00 Documentation and Configuration Management – General
  - 020.10.10.05 Product Tree – General
    - 020.10.10.05.00 Product Tree – General
  - 020.10.10.10 Documentation Management – General
    - 020.10.10.10.00 Documentation Management – General
      - 020.10.10.10.01 Document Management Platform
  - 020.10.10.15 Configuration Management – General
    - 020.10.10.15.00 Configuration Management – General
      - 020.10.10.15.01 Configuration Management Platform





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**020.10.15 Requirements Definition and Management – General**

- 020.10.15.00 Requirements Definition and Management – General
  - 020.10.15.00.00 Requirements Definition and Management – General
- 020.10.15.01 Stakeholder Requirements – General
  - 020.10.15.01.00 Stakeholder Requirements – General
- 020.10.15.05 Science Requirements – General
  - 020.10.15.05.00 Science Requirements – General
  - 020.10.15.05.05 Science Requirements – Use Cases
  - 020.10.15.05.10 Science Requirements – Use Case Analysis
- 020.10.15.10 System Requirements – General
  - 020.10.15.10.00 System Requirements – General

**020.10.20 Architectural Definition and Analysis – General**

- 020.10.20.00 Architectural Definition and Analysis – General
  - 020.10.20.00.00 Architectural Definition and Analysis – General

**020.10.25 System Level Studies – General**

- 020.10.25.00 System Level Studies – General
  - 020.10.25.01 RFI Flagging & Excision

**020.10.30 System Level Standards**

**020.10.35 Quality Assurance**

**4.4 020.15 Assembly, Integration, Verification (AIV)**

**020.15.00 Assembly, Integration, Verification**

- 020.15.00.00 Assembly, Integration, Verification – General
  - 020.15.00.00.00 Assembly, Integration, Verification – General

**020.15.05 TBD – General**

- 020.15.05.00 TBD – General
  - 020.15.05.00.00 TBD – General

**4.5 020.20 Commissioning and Scientific Validation (CSV)**

**020.20.00 Commissioning and Scientific Validation – General**

- 020.20.00.00 Commissioning and Scientific Validation – General
  - 020.20.00.00.00 Commissioning and Scientific Validation – General
  - 020.20.00.00.01 Commissioning and Scientific Validation – TBD

**020.20.05 TBD – General**

- 020.20.05.00 TBD – General
  - 020.20.05.00.00 TBD – General
  - 020.20.05.00.01 TBD



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#### **4.6 020.21 Science Communication**

##### **020.21.00 Science Communication – General**

- 020.21.00.00 Science Communication – General
  - 020.21.00.00.00 Science Communication – General
    - 020.21.00.00.01 Science Communication – TBD

#### **4.7 020.22 Array Calibration**

##### **020.22.00 Array Calibration – General**

- 020.22.00.00 Array Calibration – General
  - 020.22.00.00.00 Array Calibration – General

#### **4.8 020.23 Array Configuration**

##### **020.23.00 Array Configuration – General**

- 020.23.00.00 Array Configuration – General
  - 020.23.00.00.00 Array Configuration – General

#### **4.9 020.25 Antenna**

##### **020.25.00 Antenna – General**

- 020.25.00.00 Antenna – General
  - 020.25.00.00.00 Antenna – General

##### **020.25.01 Antenna – Optics**

- 020.25.01.00 Antenna Optics General
  - 020.25.01.00.00 Antenna Optics General

##### **020.25.05 Antenna - Mount**

- 020.25.05.00 Antenna Mount General
  - 020.25.05.00.00 Antenna Mount General

#### **4.10 020.30 Antenna Electronics**

##### **020.30.00 Antenna Electronics General**

- 020.30.00.00 Antenna Electronics General
  - 020.30.00.00.00 Antenna Electronics General
  - 020.30.00.00.01 Antenna Electronics TBD

##### **020.30.03 Integrated Electronics**

- 020.30.03.00 Integrated Electronics – General
  - 020.30.03.01 Integrated Front End Package – General (CI level)

##### **020.30.05 Front End**

- 020.30.05.00 Front End – General
  - 020.30.05.01 Band I (CI)



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- 020.30.05.01.01 – Band 1 Feed
- 020.30.05.02 Band 2 (CI)
  - 020.30.05.02.01 – Band 2 Feed
- 020.30.05.03 Band 3 (CI)
  - 020.30.05.03.01 – Band 3 Feed
- 020.30.05.04 Band 4 (CI)
  - 020.30.05.04.01 – Band 4 Feed
- 020.30.05.05 Band 5 (CI)
  - 020.30.05.05.01 – Band 5 Feed
- 020.30.05.06 Band 6 (CI)
  - 020.30.05.06.01 – Band 6 Feed
- 020.30.05.08 Dewar A General
  - 020.30.05.08.01 Dewar A
- 020.30.05.09 Dewar B General
  - 020.30.05.09.01 Dewar B

#### 020.30.10 **Cryogenic System**

- 020.30.10.00 Cryogenic Systems – General
  - 020.30.10.00.01 Cryogenic Systems – TBD
- 020.30.10.01 Refrigerator A – General
  - 020.30.10.01.01 Refrigerator A
- 020.30.10.02 Refrigerator B – General
  - 020.30.10.02.01 Refrigerator B
- 020.30.10.03 Compressor & Distribution – General
  - 020.30.10.03.01 Compressor & Distribution – TBD

#### 020.30.15 **Integrated Down Converters & Digitizers**

- 020.30.15.00 Integrated Down Converters – General
  - 020.30.15.00.01 Integrated Down Converters TBD
- 020.30.15.01 Digitizers & Serializers – General
  - 020.30.15.01.00 Digitizers & Serializers – TBD

#### 020.30.25 **Digital Back End (DBE)**

- 020.30.25.00 Digital Back End (DBE) – General
  - 020.30.25.00.01 Digital Back End (DBE) – TBD

#### 020.30.30 **Data Transmission System (DTS)**

- 020.30.30.00 Data Transmission System (DTS) – General
  - 020.30.30.00.01 Data Transmission System (DTS) – TBD

#### 020.30.35 **Antenna Time and Frequency References**

- 020.30.35.00 Antenna Time and Frequency References – General
  - 020.30.35.00.01 Antenna Time and Frequency References – TBD

#### 020.30.45 **M&C Hardware Interface Layer**

- 020.30.45.00 M&C Hardware Interface Layer – General
  - 020.30.45.00.01 M&C Hardware Interface Layer – TBD



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- 020.30.50 **DC Power Supply System**
  - 020.30.50.00 DC Power Supply System – General
    - 020.30.50.00.01 DC Power Supply System – TBD
  
- 020.30.55 **Bins, Modules, and Racks**
  - 020.30.55.00 Bins, Modules, and Racks – General
    - 020.30.55.00.01 Bins, Modules, and Racks – TBD
  
- 020.30.60 **Environmental Control**
  - 020.30.60.00 Environmental Control – General
    - 020.30.60.00.01 Environmental Control – TBD

#### **4.11 020.35 Reference Signals**

- 020.35.00 **Reference Signals – General**
  - 020.35.00.00 Reference Signals – General
    - 020.35.00.00.00 Reference Signals – General
    - 020.35.00.00.01 Reference Signals – TBD
- 020.35.05 **Reference Signal Generation**
  - 020.35.05.00 Reference Signal Generation – General
    - 020.35.05.00.00 Reference Signal Generation – General
    - 020.35.05.00.01 Reference Signal Generation – TBD
- 020.35.10 **Reference Signal Distribution**
  - 020.35.10.00 Reference Signal Distribution – General
    - 020.35.10.00.00 Reference Signal Distribution – General
    - 020.35.10.00.01 Reference Signal Distribution – TBD

#### **4.12 020.40 Central Signal Processor**

- 020.40.00 **Central Signal Processor – General**
  - 020.40.00.00 Central Signal Processor – General
    - 020.40.00.00.00 Central Signal Processor – General
    - 020.40.00.00.01 Central Signal Processor – Studies
  
- 020.40.05 **Correlator and Beamformer**
  - 020.40.05.00 Correlator and Beamformer – General
    - 020.40.05.00.00 Correlator and Beamformer – General
    - 020.40.05.00.01 Correlator and Beamformer – TBD
  
- 020.40.10 **Pulsar Engine**
  - 020.40.10.00 Pulsar Engine – General
    - 020.40.10.00.00 Pulsar Engine – General
    - 020.40.10.00.01 Pulsar Engine – TBD
  
- 020.40.20 **Test Correlators**
  - 020.40.20.00 Test Correlators – General
    - 020.40.20.00.00 Test Correlators – General
    - 020.40.20.00.01 Test Correlators – TBD



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#### **4.13 020.45 Independent Phase Cal System**

##### **020.45.00 Independent Phase Cal System – General**

- 020.45.00.00 Independent Phase Cal System – General
  - 020.45.00.00.00 Independent Phase Cal System – General
  - 020.45.00.00.01 Independent Phase Cal System – TBD

##### **020.45.10 Phase Cal System Front-End**

- 020.45.10.00 Phase Cal System Front-End – General
  - 020.45.10.00.00 Phase Cal System Front-End – General
  - 020.45.10.00.01 Phase Cal System Front-End – TBD

##### **020.45.15 Phase Cal System Back-End**

- 020.45.15.00 Phase Cal System Back-End – General
  - 020.45.15.00.00 Phase Cal System Back-End – General
  - 020.45.15.00.01 Phase Cal System Back-End – TBD

#### **4.14 020.47 Short Baseline Array**

##### **020.47.00 Short Baseline Array – General**

- 020.47.00.00 Short Baseline Array – General
  - 020.47.00.00.00 Short Baseline Array – General
  - 020.47.00.00.01 Short Baseline Array – TBD

##### **020.47.05 Short Baseline Array Antenna**

- 020.47.05.00 SBA Antenna – General
  - 020.47.05.00.00 SBA Antenna – General
- 020.47.05.01 SBA Antenna Optics
  - 020.47.05.01.00 SBA Antenna Optics – General

#### **4.15 020.50 Computing and Software**

##### **020.50.00 Computing and Software – General**

- 020.50.00.00 Computing and Software – General
  - 020.50.00.00.00 Computing and Software – General
  - 020.50.00.00.01 Computing and Software – TBD

##### **020.50.01 Computing and Software – General**

- 020.50.01.00 Computing and Software – General

##### **020.50.05 Software Engineering**

- 020.50.05.00 Software Engineering – General
  - 020.50.05.00.00 Software Engineering – General
  - 020.50.05.00.01 Software Engineering – TBD

##### **020.50.10 Software Architecture**

- 020.50.10.00 Software Architecture – General
  - 020.50.10.00.00 Software Architecture – General



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020.50.10.00.01 Software Architecture – TBD

**020.50.15 Common Infrastructure**

- 020.50.15.00 Common Infrastructure – General
  - 020.50.15.00.00 Common Infrastructure – General
  - 020.50.15.00.01 Common Infrastructure – TBD

**020.50.20 Integration & Test System**

- 020.50.20.00 Integration & Test System – General
  - 020.50.20.00.00 Integration & Test System – General
  - 020.50.20.00.01 Integration & Test System – TBD

**020.50.25 Monitor & Control**

- 020.50.25.00 Monitor & Control – General
  - 020.50.25.00.00 Monitor & Control – General
  - 020.50.25.00.01 Monitor & Control – TBD

**020.50.30 Correlator & CBE**

- 020.50.30.00 Correlator & CBE – General
  - 020.50.30.00.00 Correlator & CBE – General
  - 020.50.30.00.01 Correlator & CBE – TBD

**020.50.35 Telescope Calibration**

- 020.50.35.00 Telescope Calibration – General
  - 020.50.35.00.00 Telescope Calibration – General
  - 020.50.35.00.01 Telescope Calibration – TBD

**020.50.40 Observation Scheduling**

- 020.50.40.00 Observation Scheduling – General
  - 020.50.40.00.00 Observation Scheduling – General
  - 020.50.40.00.01 Observation Scheduling – TBD

**020.50.45 Observation Operation**

- 020.50.45.00 Observation Operation – General
  - 020.50.45.00.00 Observation Operation – General
  - 020.50.45.00.01 Observation Operation – TBD

**020.50.50 Observation Preparation**

- 020.50.50.00 Observation Preparation – General
  - 020.50.50.00.00 Observation Preparation – General
  - 020.50.50.00.01 Observation Preparation – TBD

**020.50.55 Data Processing**

- 020.50.55.00 Data Processing – General
  - 020.50.55.00.00 Data Processing – General
  - 020.50.55.00.01 Data Processing – TBD
  - 020.50.55.01.00 Imaging Algorithms – General
  - 020.50.55.01.01 Imaging Algorithms – TBD



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#### 020.50.60 **Data Pipelines**

- 020.50.60.00 Data Pipelines – General
  - 020.50.60.00.00 Data Pipelines – General
  - 020.50.60.00.01 Data Pipelines – TBD

#### 020.50.65 **Data Archive**

- 020.50.65.00 Data Archive – General
  - 020.50.65.00.00 Data Archive – General
  - 020.50.65.00.01 Data Archive – TBD

### **4.16 020.52 HPC Systems**

#### 020.52.00 **HPC Systems – General**

- 020.52.00.00 HPC Systems – General
  - 020.52.00.00.00 HPC Systems – General
  - 020.52.00.00.01 HPC Systems – TBD

### **4.17 020.55 IT Infrastructure**

#### 020.55.00 **IT Infrastructure – General**

- 020.55.00.00 IT Infrastructure – General
  - 020.55.00.00.00 IT Infrastructure – General
  - 020.55.00.00.01 IT Infrastructure – TBD

#### 020.55.05 **Antenna IT System**

- 020.55.05.00 Antenna IT System – General
  - 020.55.05.00.00 Antenna IT System – General
  - 020.55.05.00.01 Antenna IT System – TBD

#### 020.55.10 **Computing IT System**

- 020.55.10.00 Computing IT System – General
  - 020.55.10.00.00 Computing IT System – General
  - 020.55.10.00.01 Computing IT System – TBD

#### 020.55.15 **Ops IT System**

- 020.55.15.00 Operations IT System – General
  - 020.55.15.00.00 Operations IT System – General
  - 020.55.15.00.01 Operations IT System – TBD



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#### **4.18 020.60 Array Infrastructure**

##### **020.60.00 Array Infrastructure – General**

- 020.60.00.00 Array Infrastructure – General
  - 020.60.00.00.00 Array Infrastructure – General
    - 020.60.00.00.01 Array Infrastructure – Existing Facilities

##### **020.60.05 Antenna Pads**

- 020.60.05.00 Antenna Pads – General
  - 020.60.05.00.00 Antenna Pads – General
    - 020.60.05.00.01 Antenna Pads – TBD

##### **020.60.10 Operations Roads**

- 020.60.10.00 Operations Roads – General
  - 020.60.10.00.00 Operations Roads – General
    - 020.60.10.00.01 Operations Roads – TBD

##### **020.60.15 Utility Trench**

- 020.60.15.00 Utility Trench – General
  - 020.60.15.00.00 Utility Trench – General
    - 020.60.15.00.01 Utility Trench – TBD

##### **020.60.20 Fiber Utility**

- 020.60.20.00 Fiber Utility – General
  - 020.60.20.00.00 Fiber Utility – General
    - 020.60.20.00.01 Fiber Utility – TBD

##### **020.60.25 Electrical Utility**

- 020.60.25.00 Electrical Utility – General
  - 020.60.25.00.00 Electrical Utility – General
    - 020.60.25.00.01 Electrical Utility – TBD

#### **4.19 020.65 Ops Buildings**

##### **020.65.00 Ops Buildings – General**

- 020.65.00.00 Ops Buildings – General
  - 020.65.00.00.00 Ops Buildings – General
    - 020.65.00.00.01 Ops Buildings – TBD

##### **020.65.05 Science Operations Buildings**

- 020.65.05.00 Science Operations Buildings – General
  - 020.65.05.00.00 Science Operations Buildings – General
    - 020.65.05.00.01 Science Operations Buildings – TBD

##### **020.65.10 Central Operations Buildings**

- 020.65.10.00 Central Operations Buildings – General
  - 020.65.10.00.00 Central Operations Buildings – General
    - 020.65.10.00.01 Central Operations Buildings – TBD





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**020.65.15 Small Operations Buildings**

- 020.65.15.00 Small Operations Buildings – General
  - 020.65.15.00.00 Small Operations Buildings – General
  - 020.65.15.00.01 Small Operations Buildings – TBD

**020.65.20 Technical Services Buildings**

- 020.65.20.00 Technical Services Buildings – General
  - 020.65.20.00.00 Technical Services Buildings – General
  - 020.65.20.00.01 Technical Services Buildings – TBD

**4.20 020.70 Land Acquisition & Regulatory Compliance**

**020.70.00 Land Acquisition & Regulatory Compliance – General**

- 020.70.00.00 Land Acquisition & Regulatory Compliance – General
  - 020.70.00.00.00 Land Acquisition & Regulatory Compliance – General
  - 020.70.00.00.01 Land Acquisition & Regulatory Compliance – TBD

**020.70.05 Environmental Impact Statement**

- 020.70.05.00 Environmental Impact Statement – General
  - 020.70.05.00.00 Environmental Impact Statement – General
  - 020.70.05.00.01 Environmental Impact Statement – TBD

**020.70.10 Land Acquisition & Leases**

- 020.70.10.00 Land Acquisition & Leases – General
  - 020.70.10.00.00 Land Acquisition & Leases – General
  - 020.70.10.00.01 Land Acquisition & Leases – TBD

**4.21 020.75 Education & Public Outreach**

**020.75.00 Education & Public Outreach – General**

- 020.75.00.00 Education & Public Outreach – General
  - 020.75.00.00.00 Education & Public Outreach – General
  - 020.75.00.00.01 Education & Public Outreach – TBD

**020.75.05 Visitor Center**

- 020.75.05.00 Visitor Center – General
  - 020.75.05.00.00 Visitor Center – General
  - 020.75.05.00.01 Visitor Center – TBD

**020.75.10 Visitor Programs**

- 020.75.10.00 Visitor Programs – General
  - 020.75.10.00.00 Visitor Programs – General
  - 020.75.10.00.01 Visitor Programs – TBD

**4.22 020.80 Safety**

**020.80.00 Safety – General**

- 020.80.00.00 Safety – General
  - 020.80.00.00.00 Safety – General
  - 020.80.00.00.01 Safety – TBD



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## 5 Appendix

### 5.1 Abbreviations and Acronyms

Acronym	Definition
ACU	Antenna Control Unit
BOM	Bill of Materials
CASA	Common Astronomy Software Applications
CI	Configuration Item
CID	Configuration Item Definition
CIL	Configuration Item List
CPU	Central Processing Unit
DTS	Data Transmission System
FRM	Focus Rotation Mechanism
ID	Identification
IF	Intermediate Frequency
LO	Local Oscillator
MIB	Module Interface Board
ngVLA	Next Generation Very Large Array
PSN	Product Structure Number
PCB	Printed Circuit Board
PSU	Power Supply Unit
VLA	Very Large Array

### 5.2 Document Assignment Example

An example of documents assigned under the Product Tree Hierarchy, in the **Reference Signals** branch might be:

#### 020.35.00 Reference Signals – General

020.35.00.00 Reference Signals – General

020.35.00.00.00 Reference Signals – General

*020.35.00.00.00-0001-REQ LO Reference and Timing: Technical Requirements*

*020.35.00.00.00-0002-DSN LO Reference and Timing: Reference Design*

*020.35.00.00.00-0003-BUD LO Reference and Timing: Cost Estimate*