Requirements / Specification Document

Use this document to detail specifications/requirements for an item and/or ancillary services. ⓘ

TITLE: Time Scale Synthesizers ⓘ

Requesting Lab/Division/Group: Physical Measurements Lab/Time and Frequency Division/Time Realization and Distribution Group
NB688000-26-02413

General Statement of Need ⓘ

NIST requires high-precision synthesizers meant to realize a continuous time scale output in terms of programmed phase- and frequency-differences with respect to an input reference signal derived from a single atomic clock. Unlike typical radio-frequency synthesizers, time scale output synthesizers feature a) very low additive phase noise, b) deterministic phase tunability at the level of microradians or lower, c) phase-continuous operation even when frequency tuning or adjusting the phase ("phase slewing"), d) engineering to ensure continuous operation over years, and e) coherence between outputs at radio-frequency and pulse-per-second (PPS) formats.

Items and/or Ancillary Services ⓘ

Item 1: Time Scale Output Synthesizer
Quantity: Four (4)
Specifications:
1.1 - Input reference frequency 10 MHz (preferred) or 5 MHz (only if 10 MHz is unavailable), termination as 50 Ohms.
1.2 - Programmable fractional frequency tuning range > 1e-10 with a precision <= 1e-17.
1.3 - Additive phase noise < -100 dB/Hz at 1 Hz offset from carrier (10 MHz), or as ADEV(1 s) < 3e-13.
1.4 - Phase programmability resolution < 1 ps, or equivalently, < 63 microradians at 10 MHz
1.5 - Phase smoothly adjustable by "slewing" a programmed phase correction over a programmable (or sufficiently long) time interval, such that the instantaneous fractional frequency deviation from nominal may be bounded to 1e-10 in magnitude.
1.6 - At least two radio-frequency outputs (>= +10 dBm).
1.7 - At least one pulse-per-second (PPS) output capable of driving 3V into 50 Ohm (or equivalently, TTL levels).
1.8 - Accepts an input pulse-per-second (PPS) signal for coarse synchronization (+/- 50 ns for 10 MHz carriers, +/- 100 ns for 5 MHz).
1.9 - Programming interface by RS-232 (serial), USB, or Ethernet (preferred).
1.10 - Accepts 120V or 208V AC power at 60 Hz.
1.11 - Accepts 24V dc power as a backup or auxiliary source.
1.12 - Compatible with standard EIA (19") equipment rack mounting, device width < 482.6 mm.

Separately Priced Options and Services:
Item 2: [List minimum specifications.
Quantity: [Enter quantity here.]
Specifications: [Enter quantity here.]

[List any other item(s) or service requirements here using the same format above.]

Service Requirements / Item Specifications

Section ⓘ	Requirements/Specifications ⓘ
Planning Considerations ☒ N/A	☐ List any visits required to allow potential vendors to see site specific constraints. [Explain requirement here] ☐ US citizen required on-site (foreign nationals require preregistration 30 days prior) ☐ Vendor rep on-site more than three days ☐ Other considerations: [List other considerations to ensure an accurate quote]
Shipping & Delivery ☐ N/A	[Enter shipping and delivery information by item here.] **Shipping criteria:** ☐ Partial delivery acceptable ☐ Direct delivery to building required [Explain need for requirement here] Building has: ☐ Loading dock ☐ Containerization preference: [Choose container] Other requirements: [List any other requirements here] **Delivery date criteria:** ☒ Delivery of goods, installation, and training shall be completed no later than: 12-18 weeks ARO ☐ Deliver no earlier than: [Insert date here] ☒ Other: Deliver quantity 2 to 325 Broadway, Boulder CO 80305, and quantity 2 to 100 Bureau Drive, Gaithersburg MD 20899.
Electronic Media ☐ N/A	[Enter electronic media requirements by item here.] ☐ Software ☒ Electronic manuals ☐ License Key ☐ Other: [List any other Electronic Media requirements here] [Enter email address for software delivery here]
Installation ☒ N/A	[Enter installation requirements by item here.] ☐ Vendor technician on site ☐ Rigging ☐ Uncrating / Unpackaging ☐ Removal of packaging material ☐ Equipment set up ☐ Start-up services ☐ Turn key installation ☐ Other [Enter details here.] Note: When installation is required, TPOC or COR shall be the coordination point.
Facility / Utility Considerations ☒ N/A	[List site specific utility considerations by item here.] ☐ OFPM Work Order Number(s) [List any Work Order Number(s) here] ☐ Power available Voltage: [Enter voltage here] (V)

	Max Current: [Enter max current draw here] (A) Phase: [Choose phase] Frequency: [Typically 60Hz] (Hz) NEMA Plug Type: [Enter plug type here] (i.e.: NEMA L5-20P) Environment: [Choose environment] Other power consideration: [List any other power considerations here] ☐ Utility connections: [List relevant available utilities, pressure(s), and flowrate(s)] ☐ Other considerations: [List other considerations to ensure an accurate quote]
Warranty ⓘ ☐ N/A	Base Manufacturer Warranty is acceptable [If you require an Extended Manufacturer Warranty, describe the warranty requirements per item here.] What is included? ☐ Labor ☐ Parts ☐ Travel ☐ Cost and liability for returns ☐ Other: [Enter other requirements here] ☐ Warranty length: [Enter warranty length here] Period Length:[Ex. month, 6 month, year etc.]
Training ☒ N/A	[Training requirements (who, when, what, where) here. If on-site, is travel necessary?] ☐ On-site ☐ Off-site location: [Enter location(s) here] ☐ Number of trainees: [Enter number of trainees here] Scope of training: ☐ Operations ☐ Maintenance ☐ Troubleshooting ☐ Safety ☐ Other: [Enter other scope requirements here] ☐ Training materials to be provided: [Describe requirement here] ☐ Other: [Enter other training requirements here] Note: When training is required, TPOC or COR shall be the coordination point.
Inspection and Acceptance ☐ N/A	[Enter inspection requirements per item here] ☒ Planned government acceptance testing (7 business days) ☐ Gov't acceptance expected to take longer than 7 business days: [Duration] ☐ Inspection and acceptance plan: [Explain here] ☐ Other: [Enter other requirements here]
Maintenance ⓘ ☒ N/A	[Describe your maintenance requirements per item here] Period Length: [Ex. month, 6 month, year etc.] What is included? ☐ Labor ☐ Spare parts ☐ Consumables ☐ Travel ☐ Cost and liability for returns ☐ Software updates ☐ Manuals

	☐ Service plan length: [Enter service plan length here] ☐ Other: [Enter other requirements here] ☐ Requirements: [Enter requirements here] (i.e.: onsite within 72 hours, etc.) ☐ Option Period 1 ☐ Option Period 2 ☐ Option Period 3 ☐ Option Period 4
Government Furnished Material / Equipment ☒ N/A	[List any government furnished material/equipment per item here] ☐ Samples for testing ☐ Government equipment which will leave gov't site (TPOC must coordinate with division property custodian) Serial Number: [Enter Serial Number here] Description: [Enter description here] NIST property number: [Enter NIST property number here] ☐ Other: [Enter other details here]
Travel ☒ N/A	[Describe any travel requirements per item here] ☐ Explain: [Explain here] ☐ Other: [Enter other requirements here] *Vendor: To the maximum extent possible, include as part of appropriate sections above (maintenance, repair, etc.). Otherwise, it will be a separate line item, reimbursable per the Federal Travel Regulation.*

Provide suggestions to improve this form by clicking here.