Multicast Proof Of Concept

NOAA EXperimental Transmission of Satellite Terabyte Environmental Products [NEXTSTEP]

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Goal

To enhance the NESDIS data delivery capability to include the use of high bandwidth Multicast. This will provide the capability to deliver NESDIS satellite product data simultaneously to current and future external partners in a timely, reliable, and cost effective manner.

* [EUMETSAT already testing multicast distribution and plans to use it for MTG and Sentinal-3 data distribution. NOAA has been a participant in this testing.]

Background

- NESDIS delivers satellite product data to external partners. These include domestic partners such as NASA, CIMSS/U of Wisc, UCAR, etc. and international partners such as EUMETSAT, JMA, etc.
  - Plan to use Internet2 and international partner networks (NRENS) for transport.
  - Many other externals (including commercial users) would like access to NESDIS satellite data distributions.
- NOAA policy is now to use Internet2 and international partner networks (NRENS) for transport when possible. This simplifies connectivity, has very high bandwidth, and includes security as these connections go though NOAA TICS.
- The new generation of LEO and GEO satellites generate much more product data than in the past. POES 19 ~50 GB/day → SNPP ~3-5 TB/day. Comparable data volumes are expected for JPSS 1/2 and GOES-R/S/T.
- Many external partners want substantially the same data, which would result in the same data being sent many times to many different partners.

Objectives

- Create a Multicast Proof Of Concept Project (POC).
- Determine which Multicast implementation(s) could meet NESDIS requirements (public domain and/or commercial). SW & HW
- Get cooperation from Internet2 (I2) for multicast addresses and support and from International NRENS for redistribution.
- Test Multicast implementations(s) internally and externally.
- POC duration for a year

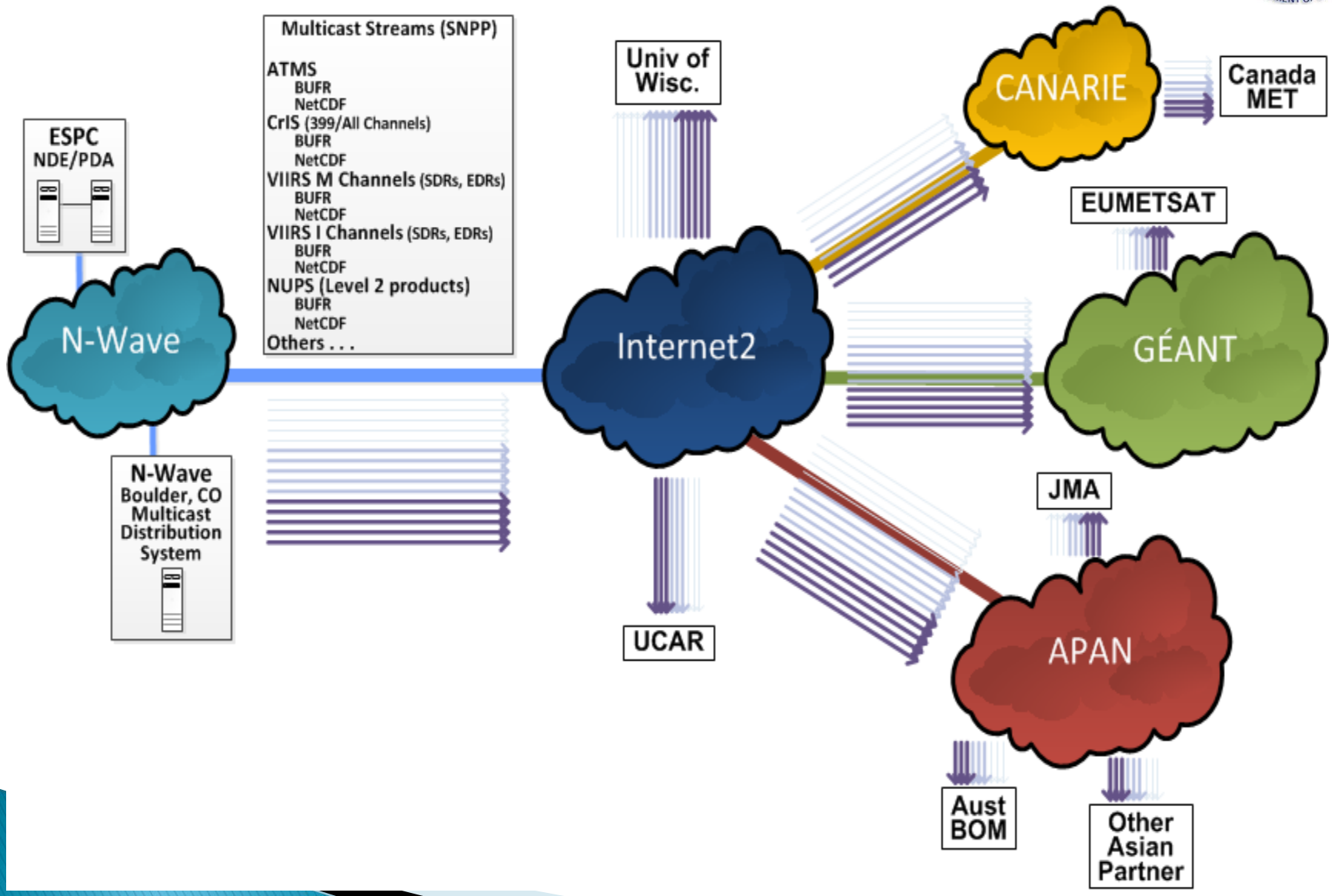
Advantages

- **Scalable**: Add many users with little NESDIS infrastructure impact.
  - NOAA distribution servers send a **single data set once** for all external users
  - "**Wholesale**" data distribution. No tailoring products or geographical sectoring.
  - NOAA distribution servers do less work. Need **fixed sized** and **smaller systems**.
  - NOAA networks need **fixed sized** and **less bandwidth**.
  - Separate streams for each product. ~ 100+ products for 3-4 TB/day volume.
- **Simple Connectivity:** Single Internet2 path for data distribution to all external partners; **no direct circuits** for each partner.
- **Enhanced security**:
  - Internet2 traffic goes **through TIC**
  - UDP (**connectionless**) used for data distribution (more secure than TCP).
  - Distribution system **at edge of NOAA network**; not on internal network.
  - Permit **only traffic on multicast stream** and end users responses.
  - **Users must register** and be approved; **Can be encrypted**.
- **Standard implementation** for all partners: Domestic, European, **Asian**, etc. All get data the same way using similar data paths.

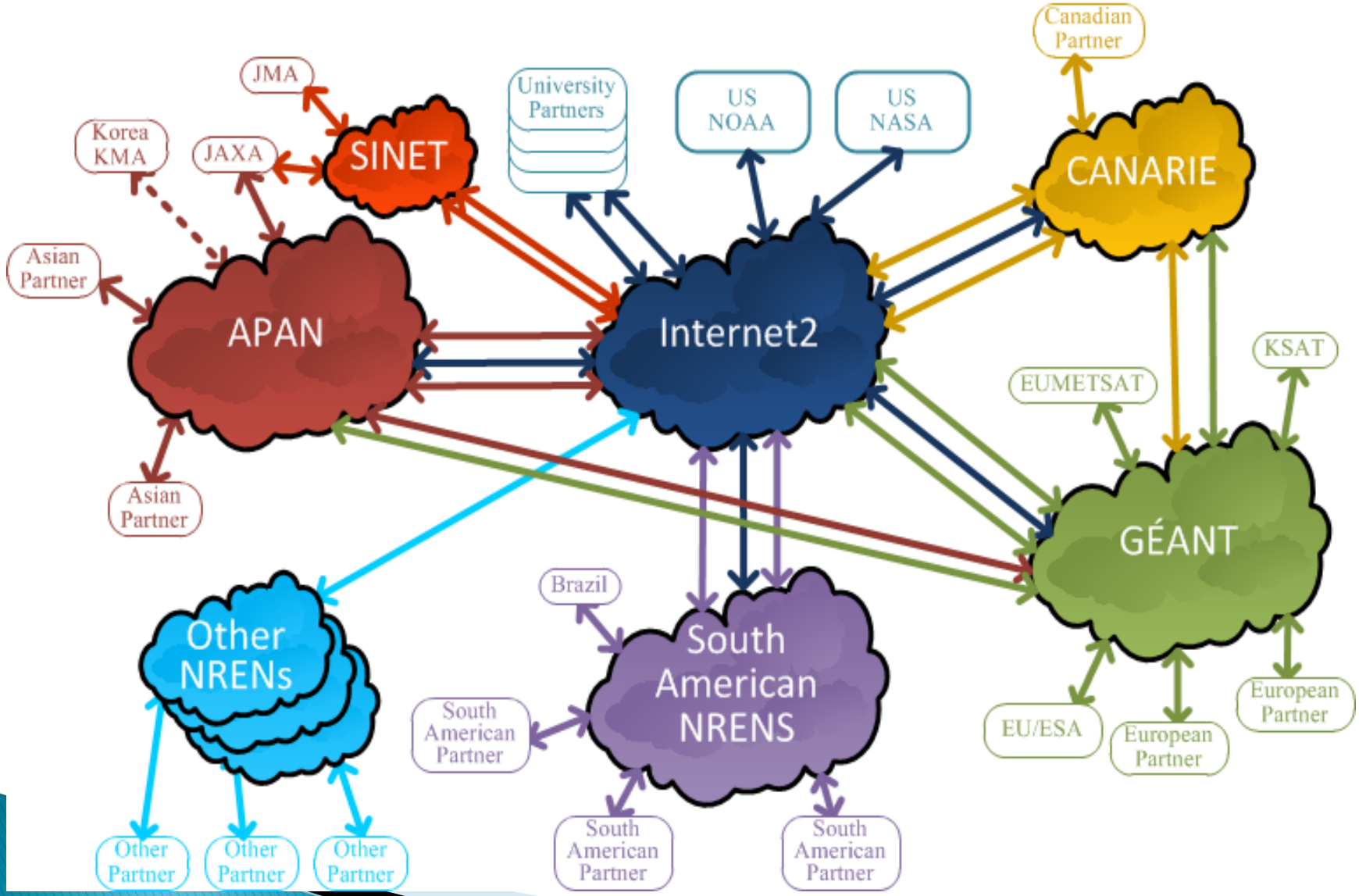
Participants

- NESDIS OSGS & CIO Office
  - Leading and participating in POC
- N-Wave
  - Engineering staff participating in POC
  - Helping design, build, configure, test, and implement systems
- Internet2
  - Provide Multicast addresses and networking support
- International NRENS
  - Provide Multicast addresses redistribution and networking support
- Domestic Partners
  - Test data receivers; provide feedback (NASA, U of Wisc, UCAR, etc.)
- International Partners
  - Test data receivers; provide feedback (Canada, EUMETSAT, etc.)

Partner Distribution



NREN Connectivity of Partners



Next Steps

- Evaluate multicast software packages
  - Determine software options: if possible to use public domain SW or if NESDIS funding needed for commercial SW purchase.
- Test Multicast implementations(s)
  - a. Using Stored/Archived Data (Internally, I2 Domestic, Internationally)
  - b. With Live Data Feed(s) from NDE/DDS etc. (Internally, I2 Domestic, Internationally)
- If successful leave on for duration of POC
- Operationalize

Questions?

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