



NASA INTEGRATED SERVICES NETWORK(NISN)/EBnet MISSION READINESS REVIEW IN SUPPORT OF THE EOS TERRA PROJECT

May 27, 1999



Agenda



- 1). Introductory Remarks.....Gerald Zgonc - 10 minutes
- 2). Mission Routed Clock Data Services... James Cameron - 20
- 3). NISN Launch Site Requirements.....Patricia Perrotto - 20
- 4). NISN ATM/Peering Support.....Tino Sciuto - 20
- 5). Implementation through 01/00.....Harold Stewart -10
- 6). Network Transitions.....Shane Smith - 10
- 7). NISN Operations Status.....Al Duany - 20
- 8). Conclusion.....Gerald Zgonc - 5
- 9). CSOC Presentation..... Jim Porterfield - 20



Introduction



- Purpose of this review is to provide status of NISN/Ebnet Readiness to support Terra voice and data requirements from pre-launch to January/2000.
- Agenda items and team presenters.
- Follow-up action items and meetings as needed.

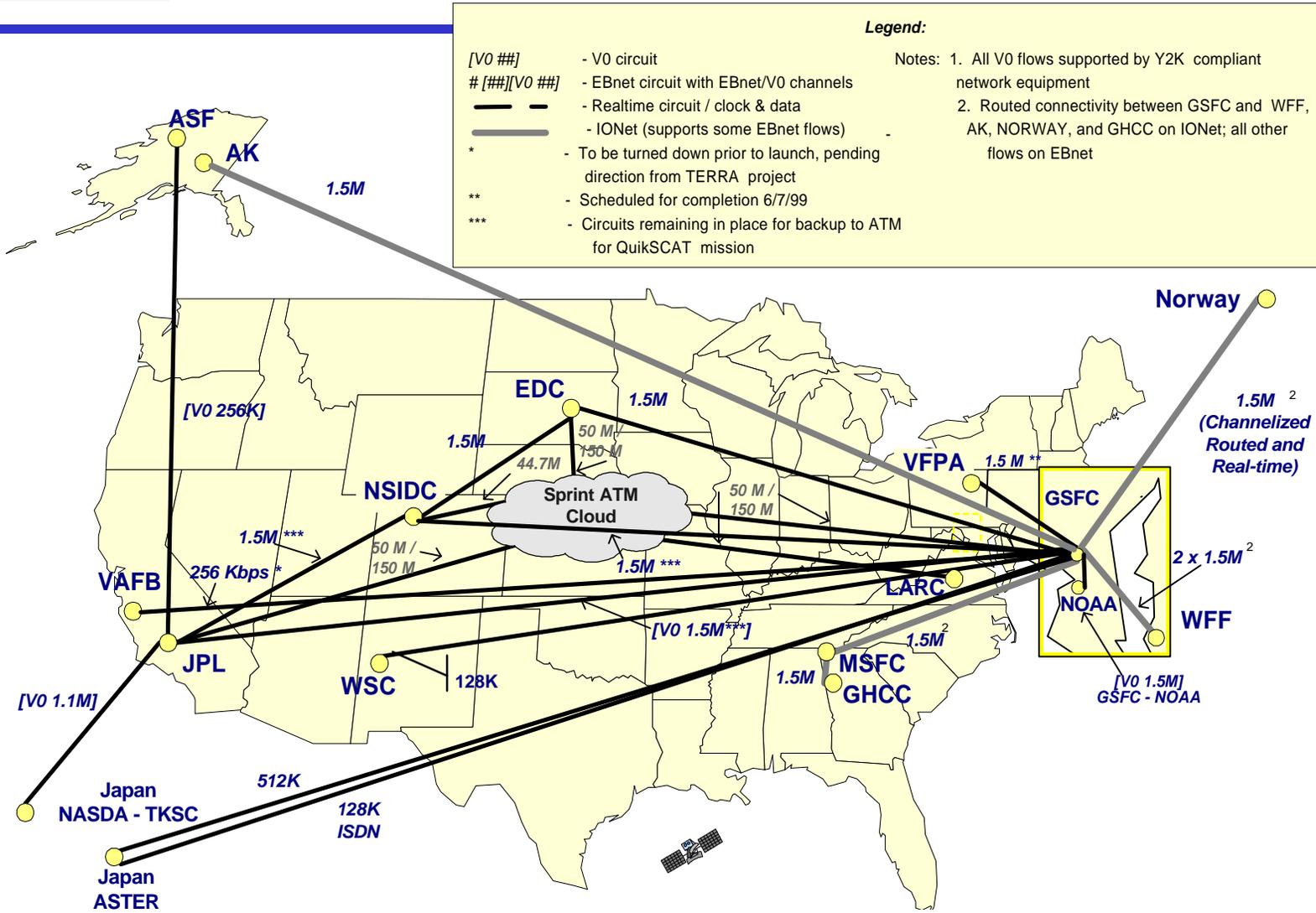


Network Design:

Dedicated Mission Routed and
Clock Data Services

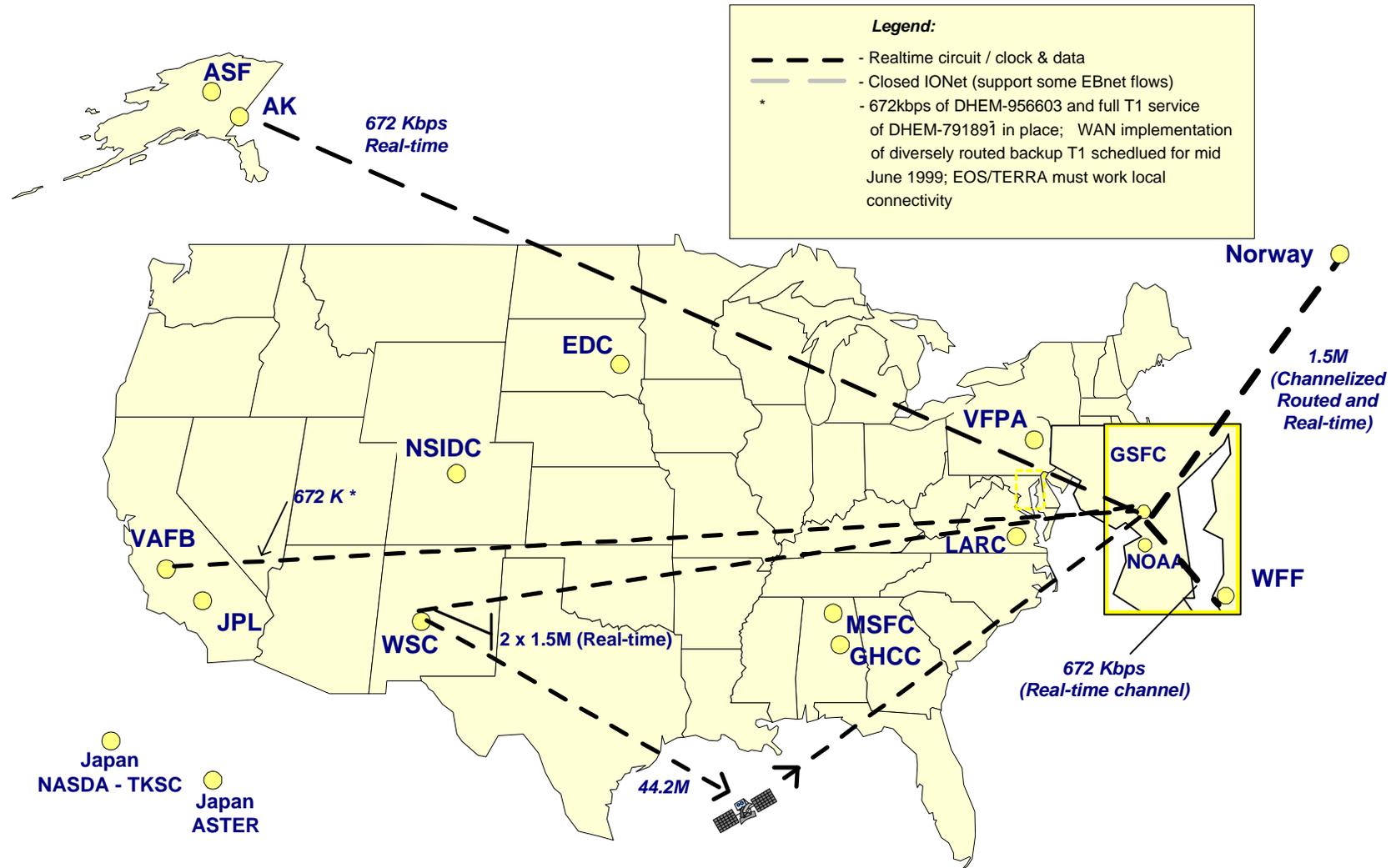
James Cameron

EOS Mission Routed Data Services (Current)





EOS Mission Clock & Data Services (Current)





Mission Clock & Data Status and Issues



- All Terra clock and data interfaces in place
- Operational Support
 - Multiplexers under Tech Control support, trouble reporting as briefed to Flight Operations Team (FOT) April, 1999
- Timeplex Firmware Upgrades:
 - Initial intermittent disconnect firmware fix: deployed 1Q1999, except AGS
 - EDOS software upgrade fixing clock perturbation believed to be the root cause of intermittent disconnects implemented 3/1999
 - Deployment of further firmware upgrade, as recommended by Timeplex and coordinated with ESDIS, scheduled for completion at all sites 6/11/99



Terra Launch and Nominal Ops Support Status

Patricia Perrotto



Terra Launch Support



- All clock/data service requirements will be supported on the NISN/EBnet dedicated clock/data interfaces, including the links to all ground stations and the launch site at VAFB
- Mission IP flows and Level 0 Science Processing requirements supported on NISN Mission IP network
- Non-level 0 Science Processing requirements supported by the NISN Standard IP network

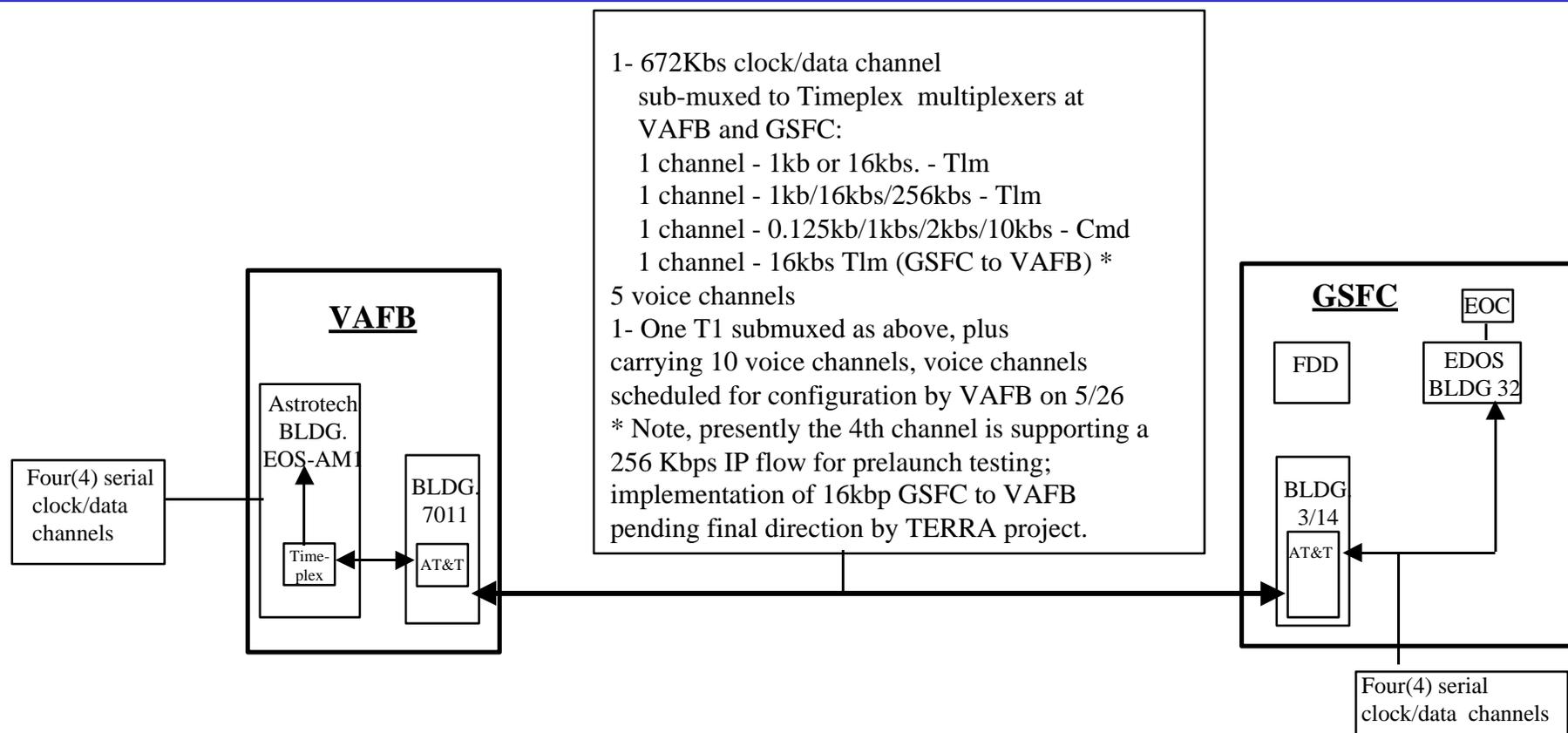
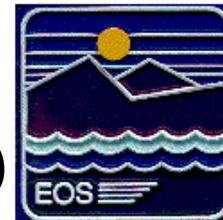


Terra Launch Support (cont.)



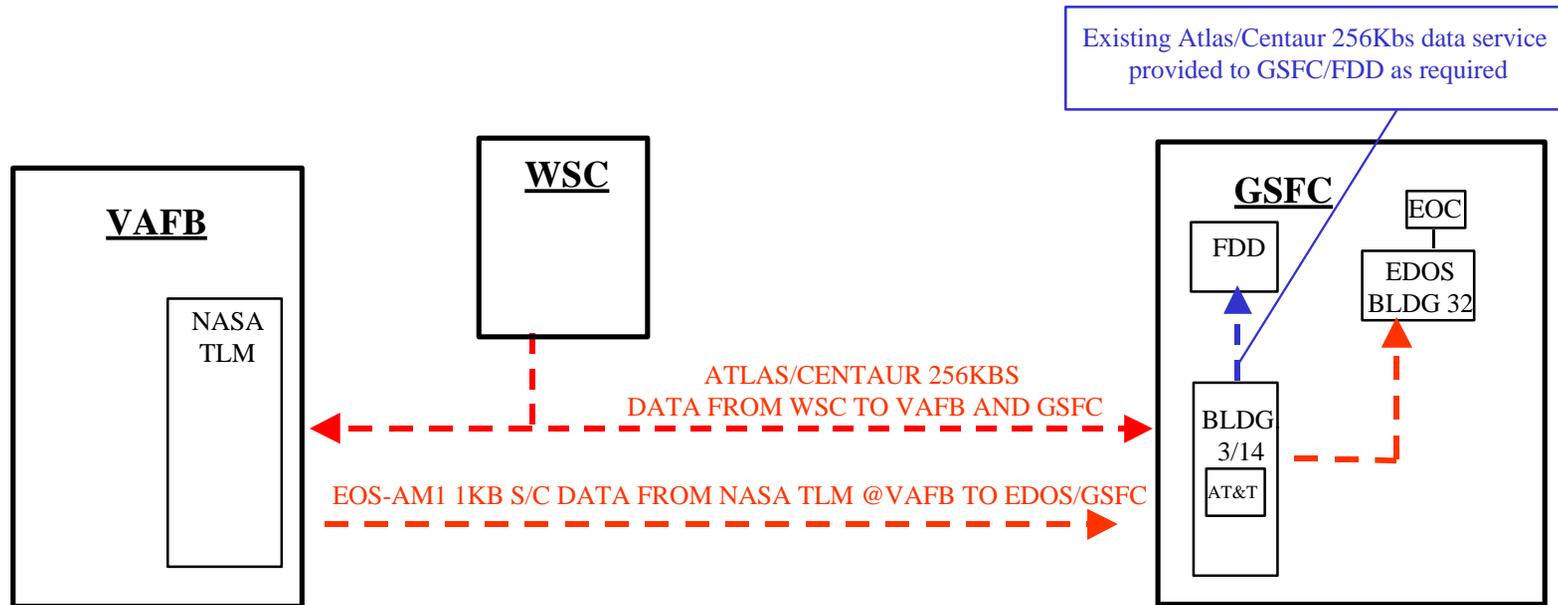
- Launch Site Network Support:
 - Primary voice conference services and clock/data interfaces between GSFC and VAFB established 5/5/99 on channelized T-1s. DHEM-956603 is configured as the prime circuit for the data channels.
 - Dedicated T1 (DHEM-791891) between GSFC and VAFB to carry voice and data channels implemented and verified on 5/20, voice channels to be configured by VAFB, 5/26/99. This interface will be used as backup for the data channels.
 - WAN implementation of diversely routed backup T1 to carry voice conference services and clock/data interfaces between GSFC and VAFB scheduled for mid-June, 1999; EOS/TERRA must work local connectivity at VAFB, if still required.
- Launch vehicle routed telemetry requirements between WSC and GSFC supported on existing IPTX connections via redundant diverse routes.
- WAN Voice services to the University of Toronto, the Ceres IOT at LaRC, and the JPL MISR IST in place: final connectivity must be accomplished by site personnel responsible for local connections. All other voice requirements in place.

Terra Launch Site Support (Clock&Data)





Terra/Centaur Launch Support/Data (Encapsulated 4800BB over Closed IOnet)





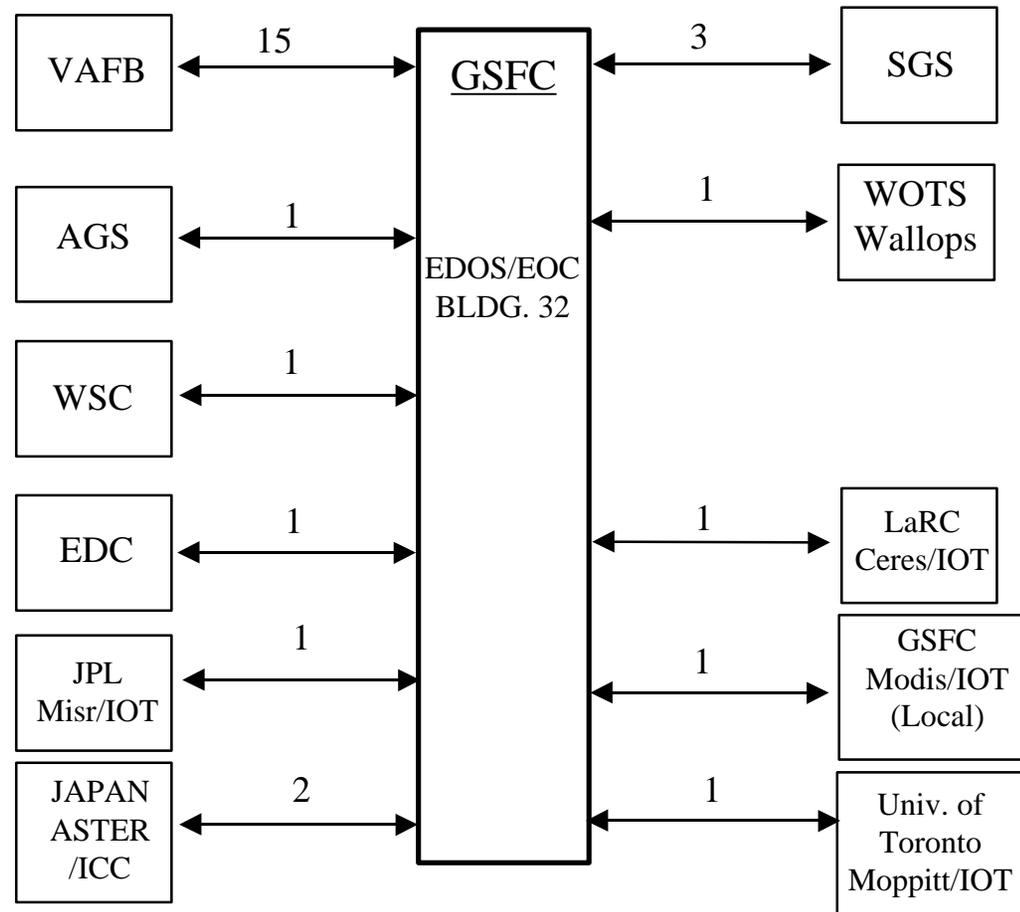
Terra Launch Support/Voice



Requirements

LOCATIONS

1. GSFC/VAFB - 15 voice circuits - primary in place backup scheduled 5/16/99
2. GSFC/AGS - 1 voice circuit - in place
3. GSFC/WSC - 1 voice circuit - in place
4. GSFC/EDC - 1 voice circuit - in place
5. GSFC/JPL(MISR/IOT) - 1 voice circuit - WAN connectivity in place, **EOS/TERRA and MISR/IOT must work with JPL to provide local connectivity**
6. GSFC/SGS - 3 voice circuits - in place
7. GSFC/WOTS - 1 voice circuit - in place
8. GSFC/LaRC(CERES/IOT) - 1 voice circuit - WAN connectivity in place, CERES/IOT must work with LaRC to provide local connectivity
9. GSFC/(MODIS/IOT) - 1 voice circuit(local) - in place
10. GSFC/Univ. of Toronto(MOPPITT/IOT) 1 voice circuit - WAN connectivity in place, MOPPITT/IOT must work with Univ. to provide local connectivity
11. GSFC/Japan(ASTER ICC) - 2 voice circuits - in place





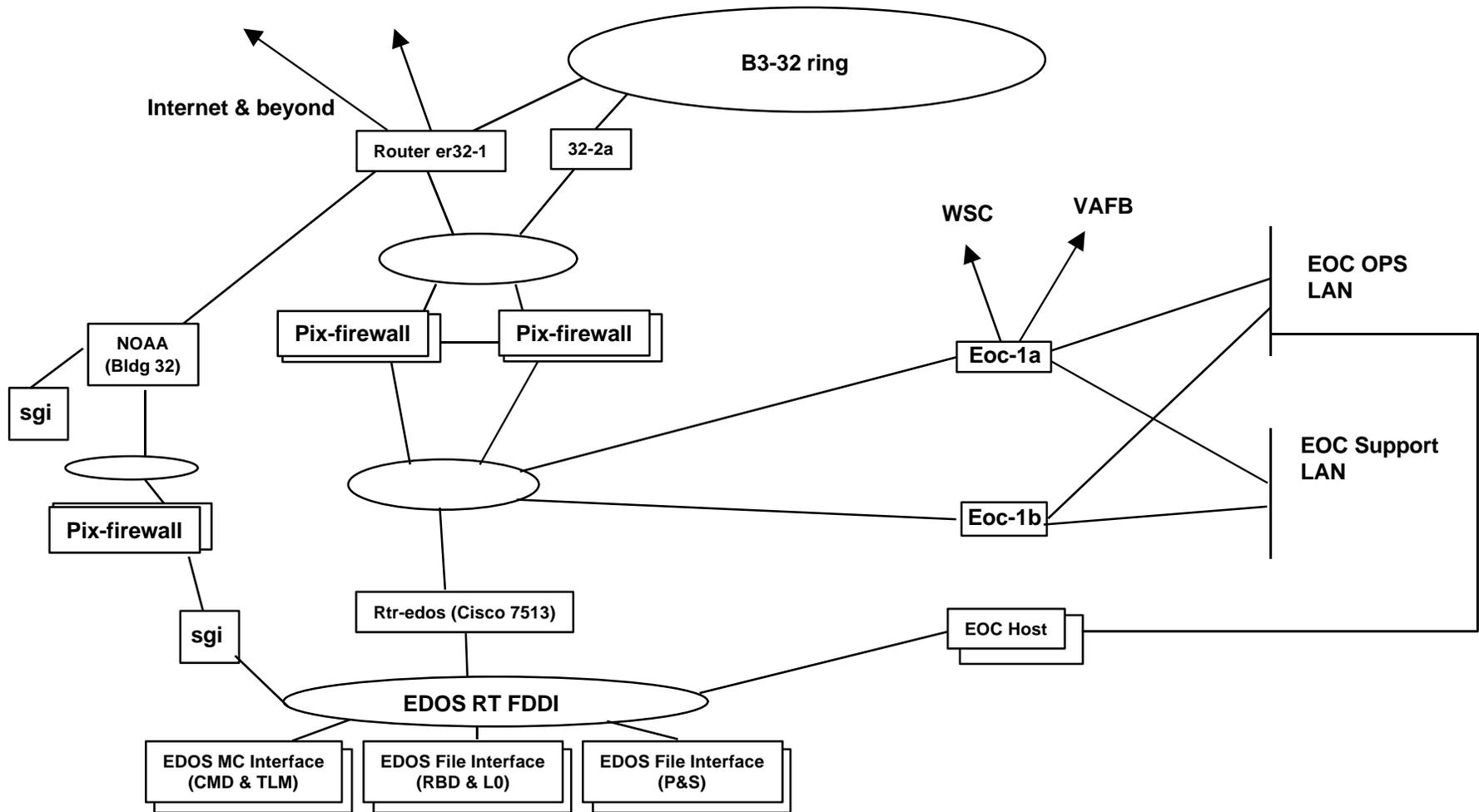
NASA's Telecommunications Provider

Terra Nominal Operations Support



- All non-launch specific, nominal operations mission requirements in place and verified by EOS project significantly prior (months, or more) to Terra launch freeze; supporting Wide Area Network implementation described in Section 2.
- Testing of recent modifications to EDOS \Leftrightarrow EMOS connectivity and introduction of firewalls being accomplished through EOS Terra launch preparation testing. Current status:
 - EDOS/EMOS \Leftrightarrow NOAA firewall in place, no problems
 - EDOS/EMOS \Leftrightarrow DAAC firewall in place, restrictions not implemented
- NOTE: All NISN-provided network equipment is Y2K Compliant

EOS EDOS <=> EMOS Connectivity





Current Implementation

ATM Backbone and Peering

A.Sciuto



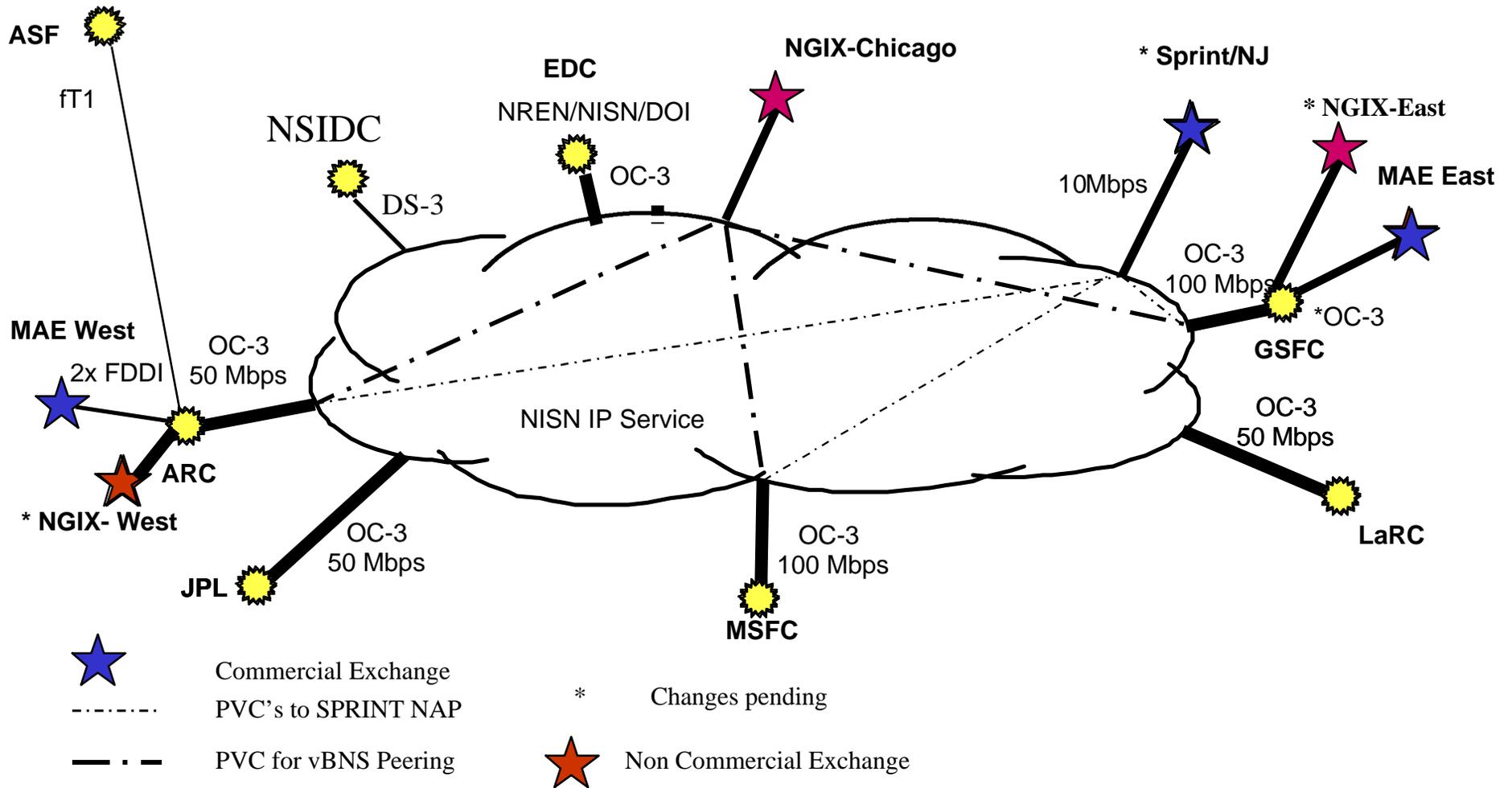
Topics



- EOS Support Architecture
 - NISN and NREN Bandwidth Sharing
 - Technology Transfer
- Current and planned Peering
 - National
 - International



EOS Support Architecture





Backbone Load for TERRA Support



SITE	Science Inter-NASA Mbps	Science Commodity Mbps	Science NGI-net Mbps	Mission Out Mbps	Mission In Mbps	Current In Mbps	Current Out Mbps	Total Out Mbps	Total In Mbps
EDC	13.1	3.6	7.2	1	14	NA	NA	24.9	14
GSFC	35.3	19.2	9.6	49	3	30	23	136.1	33
JPL	2	1	0	1	2	3	10	14	5
LaRC	16	4.3	8.5	4	26	10	4	32.8	36
NSIDC	1	1	0	1	3	NA	NA	3	3

- Comments

- NISN Standard services load is based on the latest requirement assumption document
- Current load reflects the measured ATM layer utilization at the Network access port expressed in Mbps
- GSFC only problematic site
 - NISN and NREN sharing adjustment and timing



Network Capacity



Location	Access Line Rate	NISN Share	Total Requirement
EDC	OC3	50 Mbps	24.9
* GSFC	OC3	50 Mbps	136.1
JPL	OC3	50 Mbps	14
LaRC	OC3	50 Mbps	36
NSIDC	DS3	Full DS3	3

* At GSFC

- NREN has no high bandwidth requirement for GSFC in FY99 and that 50 Mbps will suffice
- 100 Mbps WAN access in addition to OC-3 connection to MAE-East and partial OC-3 connection to NGIX-East will meet the 136 Mbps requirement



NISN and Peering



- Commercial
 - NISN is present in major exchanges
 - MAE-east, MAE-west
- Nationally
 - Activities among Federal Agencies
 - NSF (National Sciences Foundation)supported
 - vBNS (very High Performance Network Service)
 - Peering at Chicago and MAE-east
 - NGI (Next Generation Internet) Program
 - Active Participation on NGI and JET (Joint Engineering Team)
 - Recognized the value of NGIX (NGI Exchange) idea and proposed the implementation of an NGIX-east at GSFC
 - Committed to join in at least three NGIXs (east, west and central)
 - Non- government sponsored
 - Internet2 and Abilene
 - Requested peering relation to support Universities moved from vBNS to Abilene
- Internationally
 - Established peering with APAN 3/99
 - Potential peering partners are CA*net2, DANTE, DFN and others



Implementation
through
01/00
Harold Stewart
Please see handout



Network Transitions of EBnet, V0, and ATM

Shane Smith



EBnet Infrastructure Changes



- V0 transition to EBnet, completed on March 31, 1999.
- The EBnet transition to ATM support at GSFC, EDC, LaRC, JPL and NSIDC, complete May 6.

In Summary:

- The network is ready to support the Terra Mission.



NISN Ops Status

Al Duany



General Trouble Reporting



- User identifies/recognizes communications problem
- User reports problem:
 - Space Network - Network Control Center TDRS Manager (NCC TM): 301-286-1817, or, if supporting, Network Operations Manager (NOM): 301-286-1874 or 1875
 - Mission - Network Operations Management Center (NOMC): 301-286-6141
 - Science Support - NISN Information Support Center (NISC): 256-544-1771
- User identifies interface experiencing trouble, including:
 - Type of Interface: Routed or Clock & Data
 - If Routed:
 - Source and Destination IP addresses
 - Multicast group, if applicable
 - If Clock & Data
 - Source and Destination locations nodes
 - Data Channel (e.g., channel 1:8:1)
 - Describe problem (e.g., no data, corrupted data, when first noticed, history, etc.)
 - Contact names and phone numbers at Source and Destination



Network Operations Management Center Roles and Responsibilities



NOMC (GSFC CommMgr)

- Responsible for NISN Mission Support Services.
- Receives trouble reports.
- Coordinates with Tech Control, GSFC IPNOC, Voice Control, and maintenance for services restoral and performance testing.
- Initiates escalation procedures for carrier services.



NISN Information Support Center Roles and Responsibilities

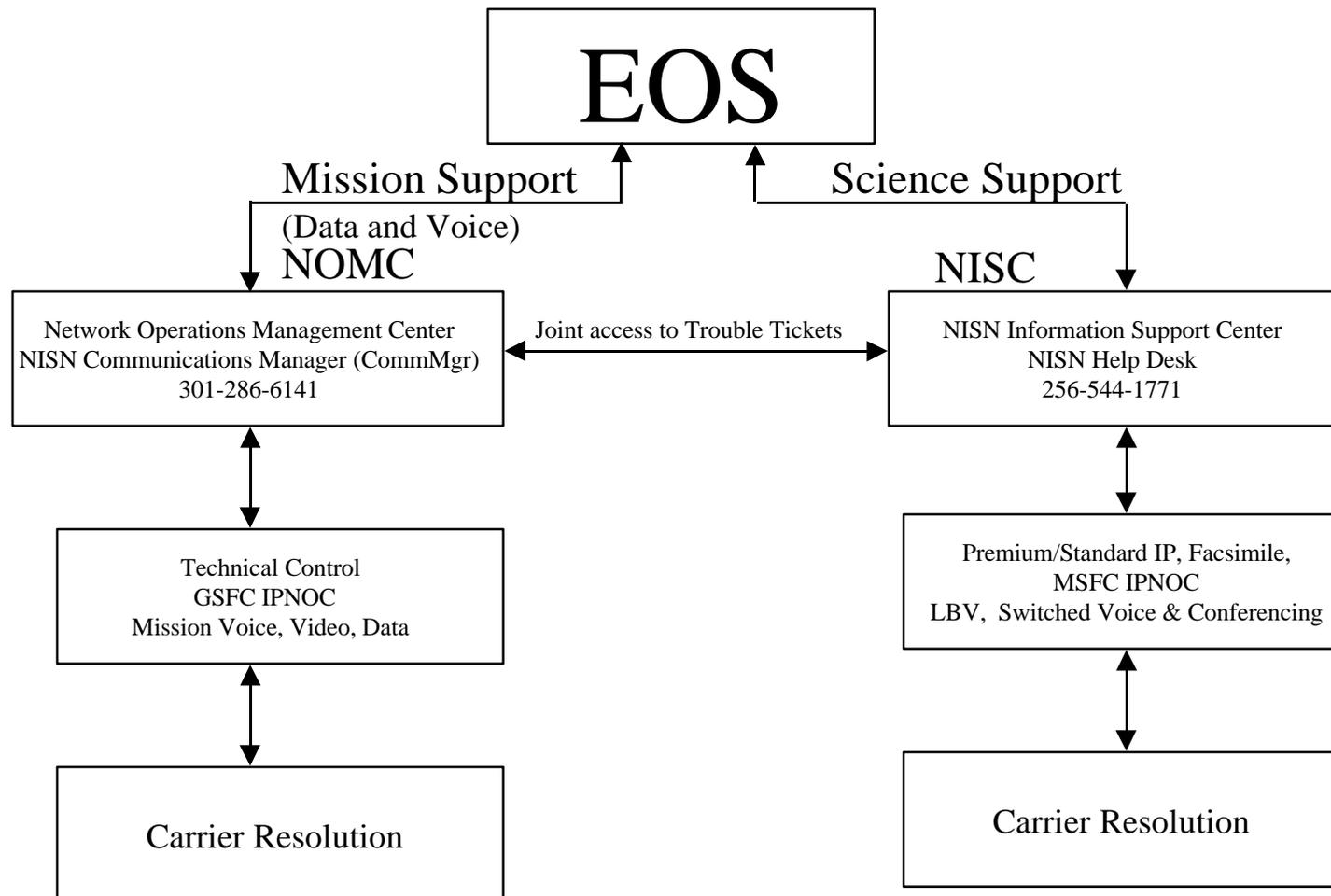


NISC

- Responsible for NISN Science Support Services.
- Receives Trouble Reports.
- Coordinates with MSFC IPNOC for services restoral and performance testing.
- Initiates escalation procedures for carrier services.
- Coordinates services and equipment releases.
- Monitors Network Performance.



Mission / Science Trouble Reporting





Terra Mission Staffing



- Dedicated Terra Mission Communications Manager(MCM)will be on console from L-6 hours to L+3 hours
- Conversion Device (CD) Manager/Commgr/IPNOC/Voice Control/Tech Control/Maintenance sections are all staffed 24 x 7 by operationally qualified personnel
- IP NOC Engineering personnel will be on-call throughout mission support



Conclusion



Questions

Follow-up Action Items(A.I.'s)

Follow-up meetings



BACKUP SLIDES



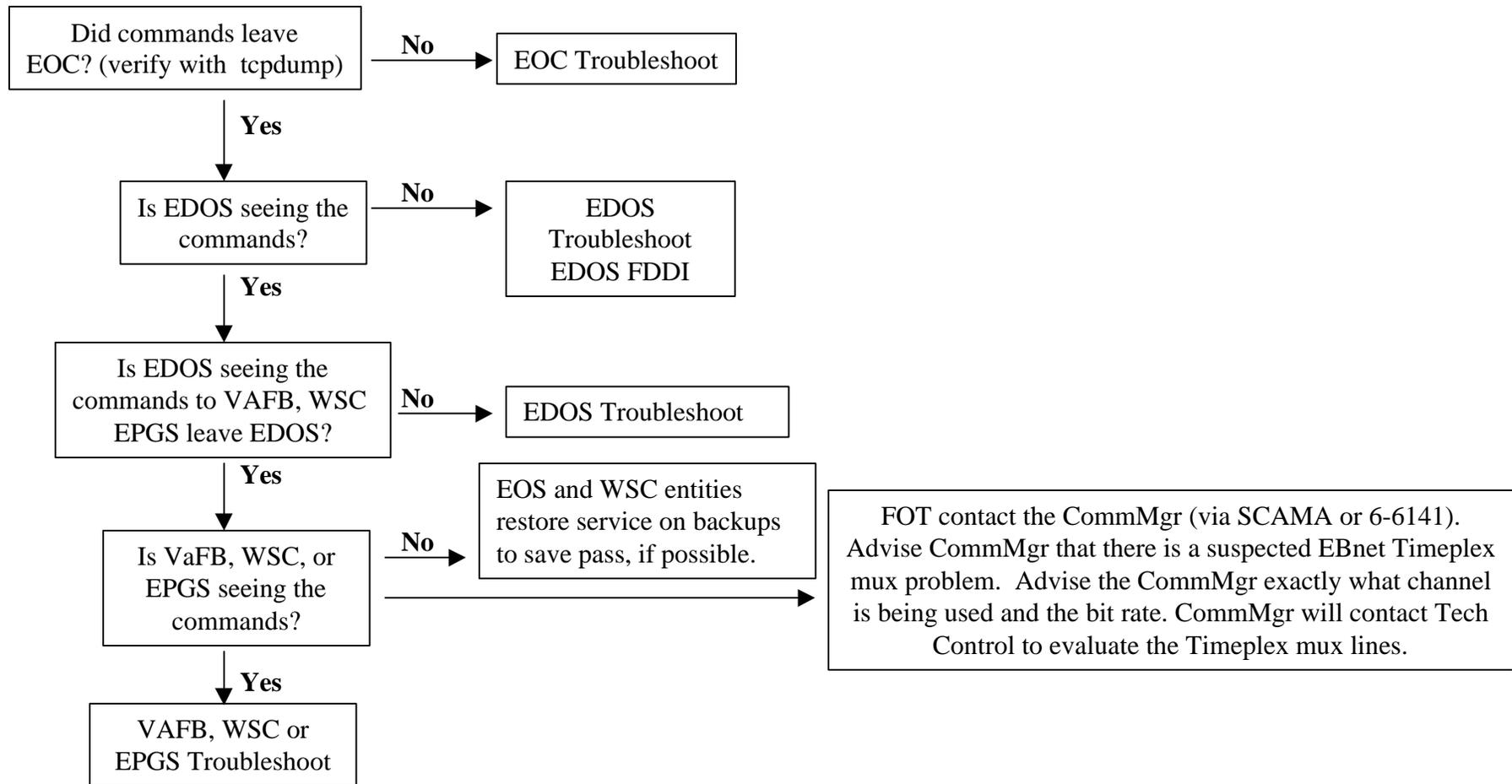
Terra Communications Trouble Reporting



- Communications-related trouble reporting briefed to Flight Operations Team in April and May, 1999
- Details relating provided to EOS operations personnel included:
 - Mission Commanding troubleshooting
 - Mission Telemetry troubleshooting
 - Generic routed data troubleshooting
 - Failover procedure between prime and backup circuits supporting clock&data connectivity between GSFC and VAFB
- Note: Backup voice services to VAFB will be made available by NISN, as required

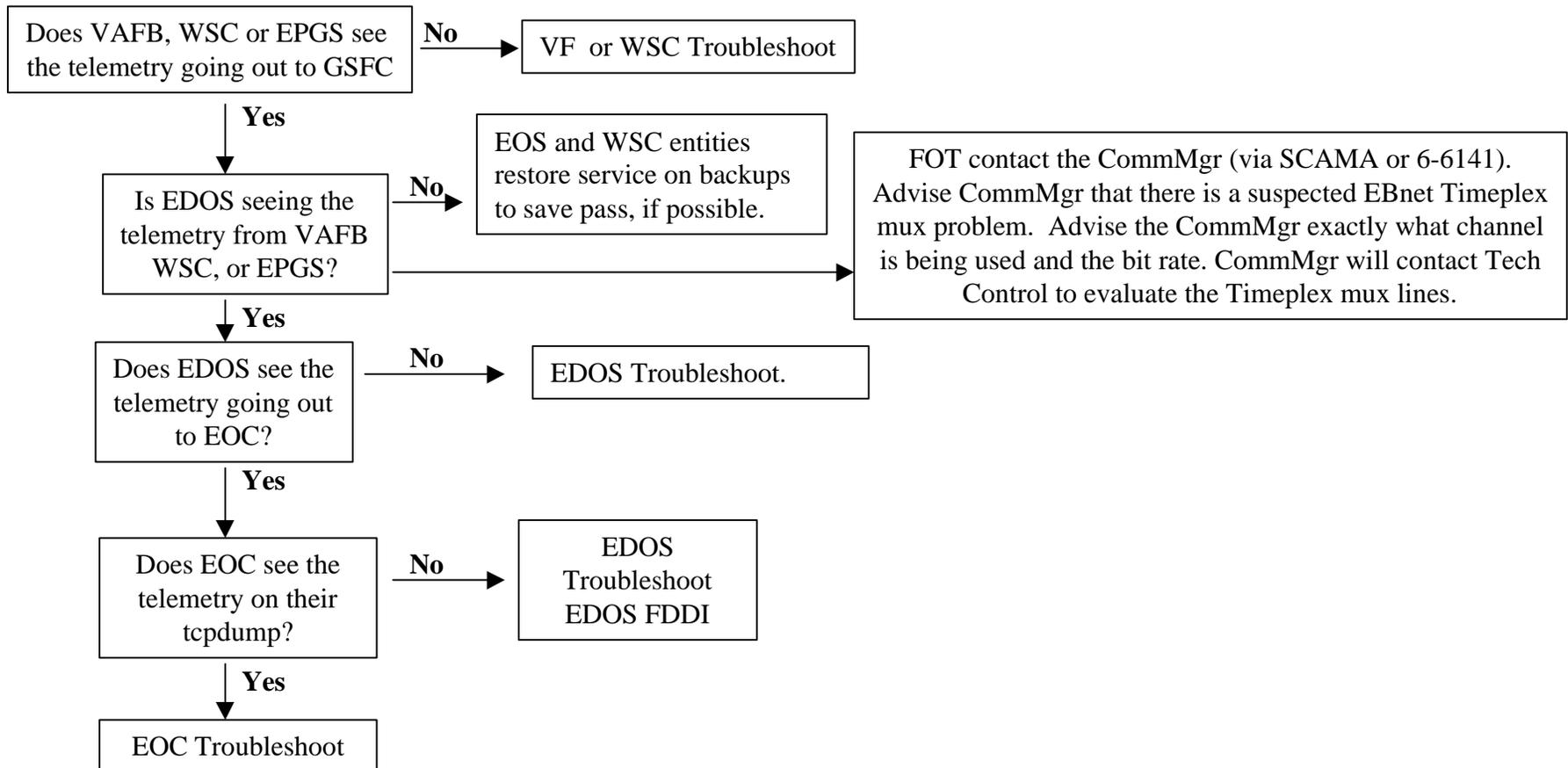


Terra Mission Commanding Troubleshooting





Terra Mission Telemetry Troubleshooting





Establishing Launch Site Connectivity via Backup Circuit



- Procedure for switching data to backup T1 to VAFB
 - FOT notifies CommMgr and Networks Ops Manager (NOM), if available, of problems on data service and requests data be switched to backup circuit
 - CommMgr notifies Tech Control and Tech Control coordinates failover of data with Astrotech/VAFB Comm
 - Once data transitioned from primary to backup T1, NISN will troubleshoot problem on prime circuit
 - Upon resolution of problem, CommMgr will notify FOT; FOT will decide if and when to revert to prime circuit
 - If problems persist on backup circuit and EOS systems are ruled out as cause, affected data channels will need to be released to Tech Control for troubleshooting of connectivity between B-32 and B-3/14 (BERT testing of links and channels to verify continuity and frequency verification)
- Backup voice services will be made available by NISN as required



Terra Routed Data Trouble Reporting



- **To report IP problems to the CommMgr or the NISN Help Desk the following information must be provided:**
 - IP address of the host/server which is the source of the data
 - IP address of the host/server which is the destination of the data
 - If applicable, provide multicast address (group address) for multicast data flows
 - Traceroute information may be helpful, but will provide limited assistance because ICMP is being block at several locations; traceroute information from IST's may be of benefit in solving IST problems
- **Notes:**
 - **IP problems on R/T Command/Telemetry between EOC/EDOS will be directed to EDOS to troubleshoot because the IPNOC no longer has responsibility of the networking involved in these data flows.**
 - If EDOS or EOC requests, IPNOC will assist in troubleshooting these problems to the extent that resources are available.
 - Pinging through a firewall will be useless because ICMP is blocked by firewalls.
 - IPNOC will determine which devices under their management will be rebooted or otherwise modified, such activities will be coordinated with affected EOS users.