MCC Upgrade Projects Since STS-109

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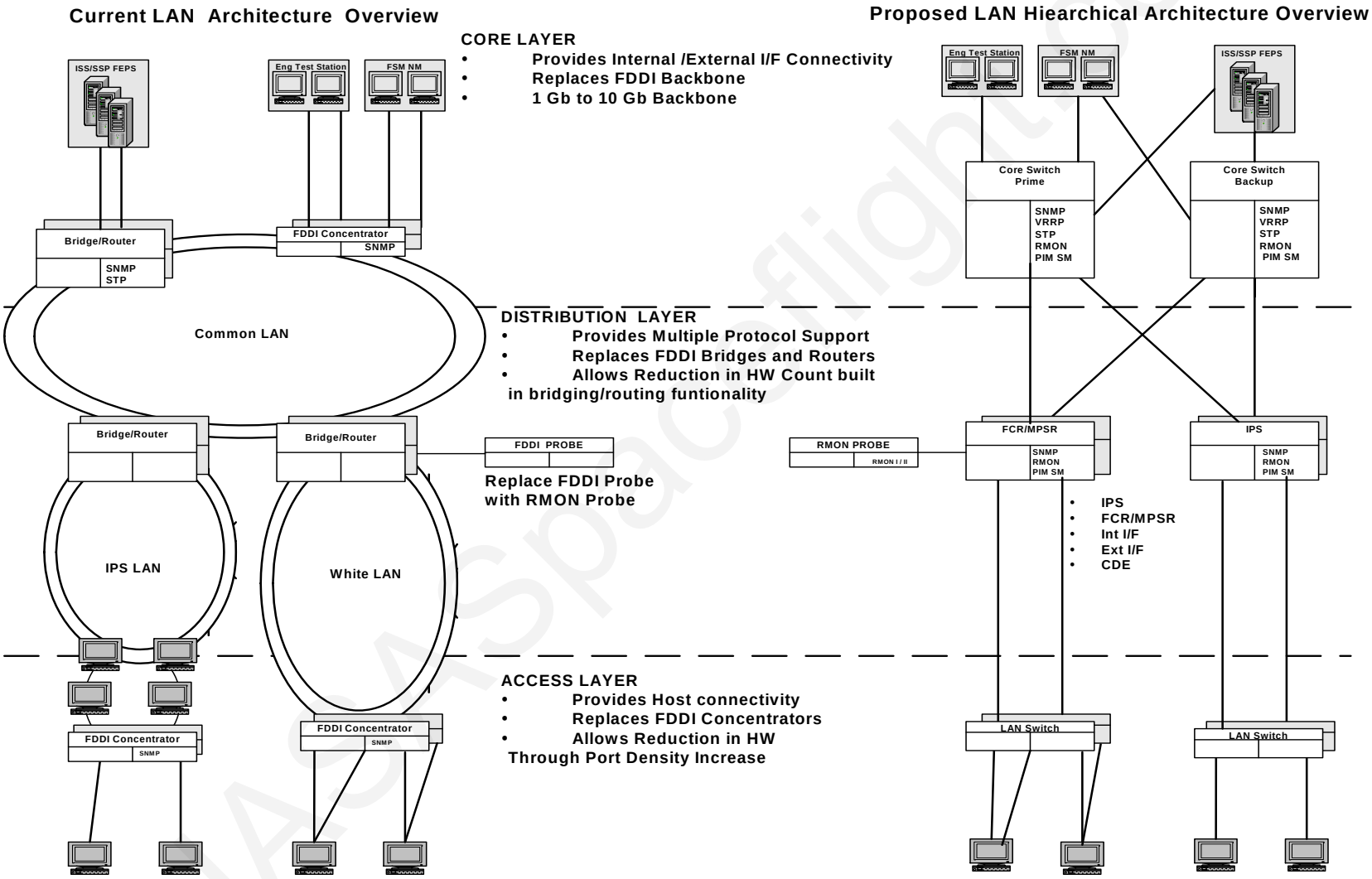
Purpose

- Awareness of changes in MCC configuration changes since STS-109/SM-3B
  - MCC LAN Replacement
  - FCR-1 Build Up
  - Mission Workstation O/S Replacement (MWSOR)
  - Mission Ops Voice Equipment (MOVE)
- Allow team to assess impacts, if any, of those changes

MCC LAN Replacement

- Converted MCC backbone LAN from fiber, ring architecture to switched ethernet
- Equipment was no longer maintainable
  - Industry switched from fiber to copper
- Requirements were near exceeding capacity
  - Frequent data drops experienced due to network overload
  - Implemented draconian workstation restrictions to ensure data integrity during critical periods
- Increased capacity from 100mbps to 1gbps
  - Still 100mbps to workstations
- MCC flew in final configuration for STS-121 and 115
  - Significant performance increases observed
    - Core switches running < 10% of capacity
    - Previous LAN frequently ran > 27% of capacity, peaking at 45-50%
  - No reported data drops attributable to LAN performance

Architecture Comparison



FCR-1 Build Up

- Former FCR-1 converted to Telescience Center in late 90s
  - Following transition to WFCR, facility was under utilized
  - Anticipated growth in ISS science program
- Growth in ISS Flight Control Team size made continued use of the BFCR impossible
  - Several disciplines were sharing consoles
  - Console resources inadequate for Gemini discipline
  - ISS systems growth required additional capability
- Decision made in 2005 to convert TSC back into FCR-1 for ISS FCT

FCR-1 Build Up

- Needed to provide alternate accommodations for science team
  - 30M/217 selected-had best balance of size and privacy
  - No anticipated use beyond 13A.1, SpaceHab mission
- Table space in 3301 POCC outfitted with workstations to accommodate SpaceHab for 12A.1 and 13A.1
- Space reserved in former BFCR for a potential HST mission, to replace 30M/217

FCR-1 Build Up

- FCR-1 recommissioned in October 2006
  - Workstations removed from BFCR and installed in FCR-1
- BFCR to be outfitted with new PC based workstations
  - Serve as HST mission support room
  - Support evolving Constellation activities

Mission Workstation O/S Replacement

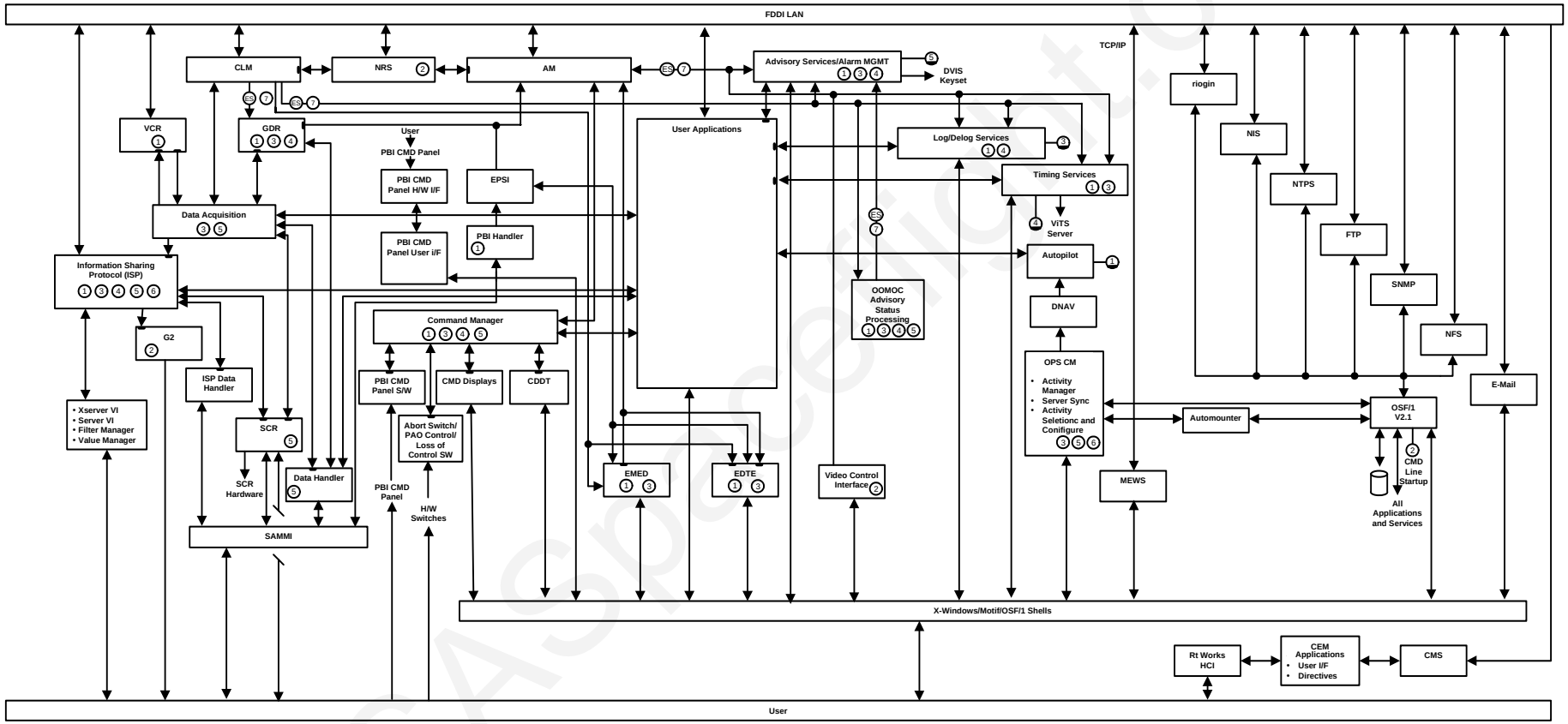
- MWSOR project initiated based on termination of support by equipment vendors
  - HP sunset on operating system support in June 2007. JSC negotiated a custom support contract that extends until 12/31/2009
  - Workstation hardware is no longer manufactured
- Replacing DEC/Compaq/HP workstation/server hardware with commodity PCs
- DEC based UNIX being replaced with RedHat Enterprise Linux O/S

Mission Workstation O/S Replacement

- Massive software porting effort has been going on since 2005
  - 4 million lines of platform services code
    - PSS provides common MCC functionality
      - Telemetry
      - Timing
      - Command
  - 15 million lines of user code
    - User code provides discipline specific applications
      - Telemetry displays
      - Limit sensing
      - Plotting
- User testing begins in April 2007

Mission Workstation O/S Replacement

MCC Workstation Software Architecture



Legend

- Uses Autopilot for Startup
- Uses Command Line Startup
- Uses Log/Delog Services
- Uses Timing Services
- Uses Advisory Services/Alarm MGMT
- Uses NRS Direct
- Event Services (ES) Uses
- All Users of ES Must include the ES API/Library
- Application A includes B's API or Library
- Applications Using Service C include C's API or Library

Mission Workstation O/S Replacement

- BFCR is being outfitted with new workstations as we speak
  - In addition to serving as an HST mission support facility it be used as a test facility to validate new software
  - MCC will operate in a hybrid configuration for several shuttle flights
  - Rooms may be split DEC/Linux, Disciplines may be split DEC/Linux
  - Each configuration will be tested through user test and simulation before being used in flight
- 3301/POCC also outfitted with Linux workstations for development/test activity
- Installation activity will be spread over the next several years, concluding in late 2008

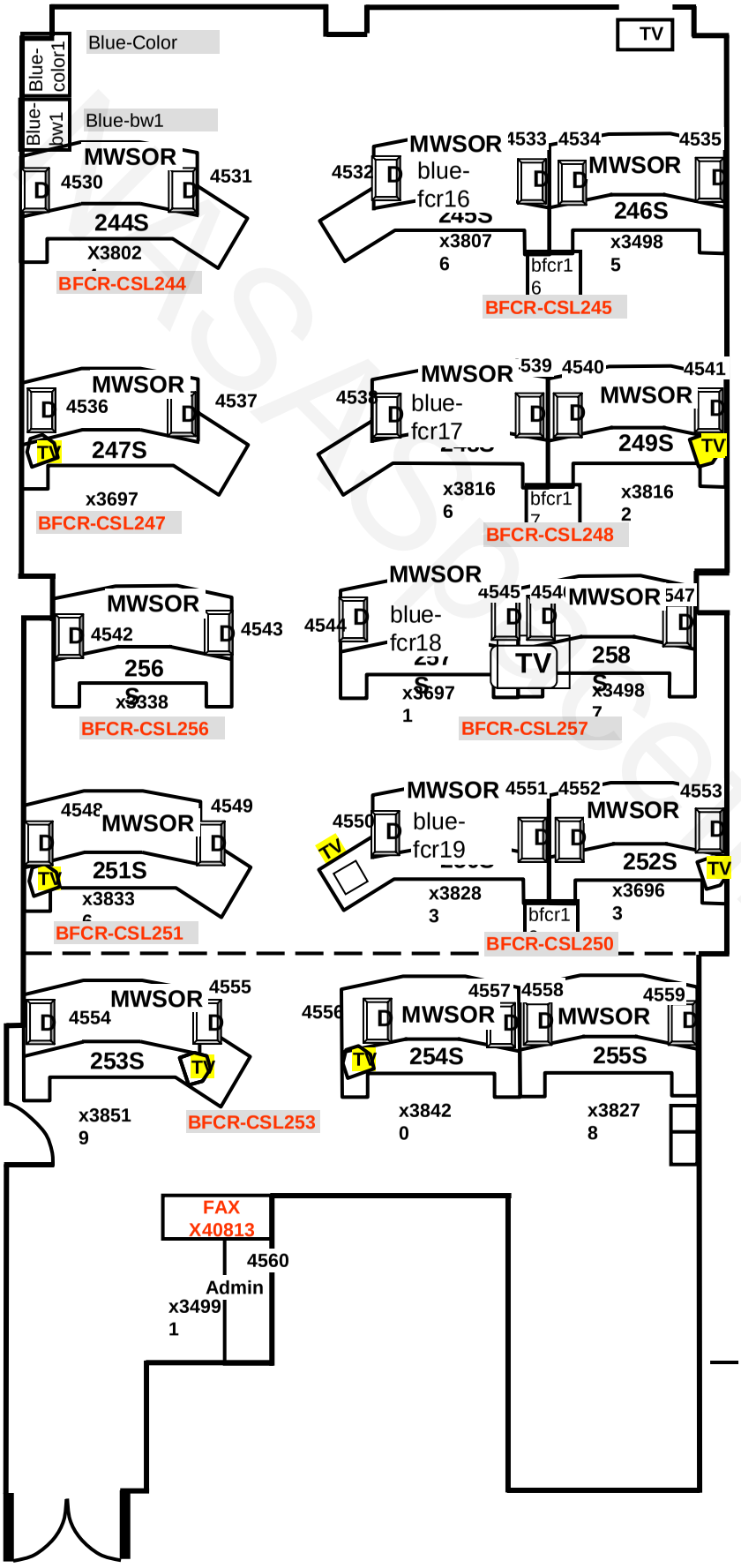
Mission Workstation O/S Replacement

BLUE FCR
30S Rm 2326

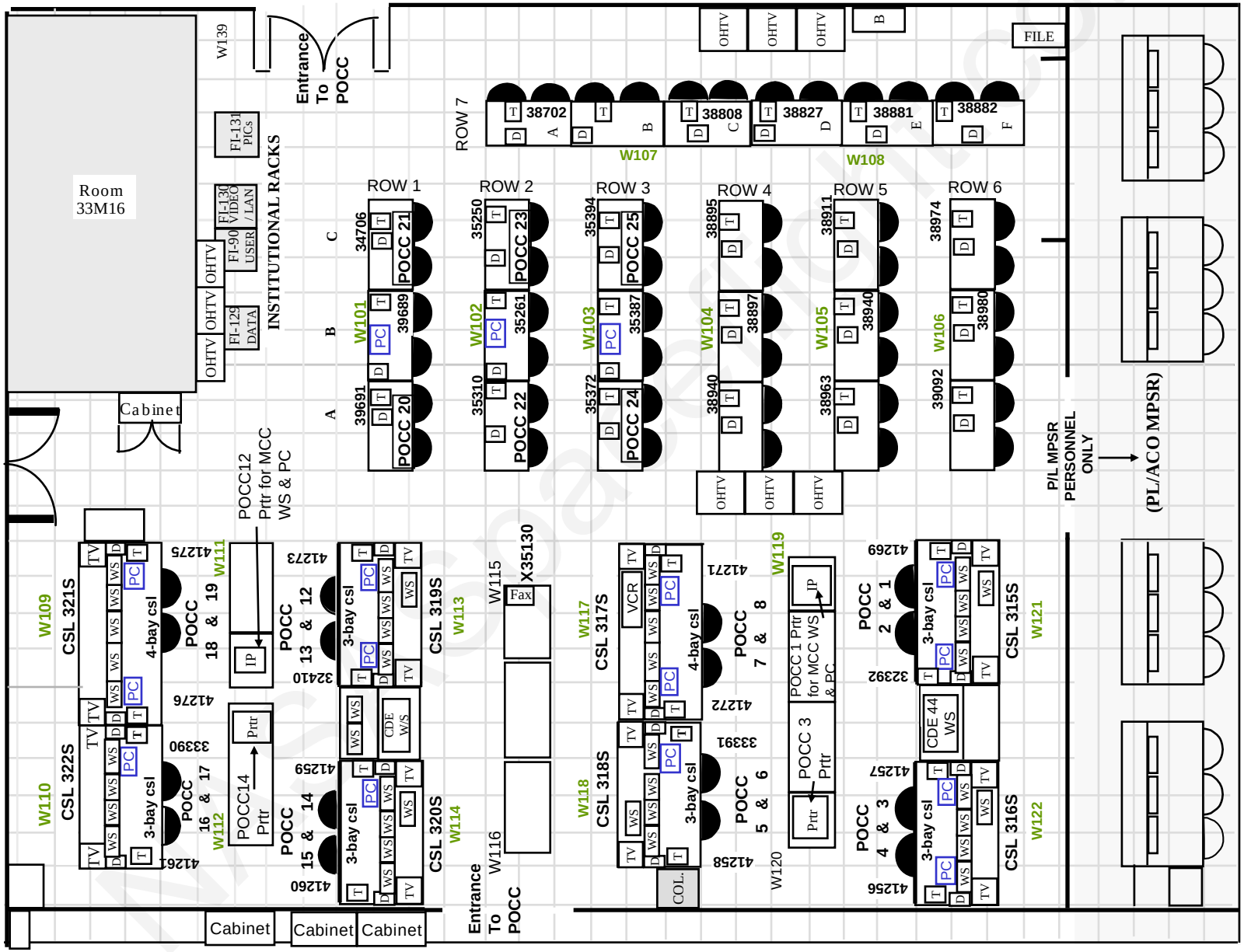
Flight Control Room 2326
1 – Color network Printer
3 – B& W MCC network printers ex:

11 – PC Network printers
17 – Linux (MWSOR) ws

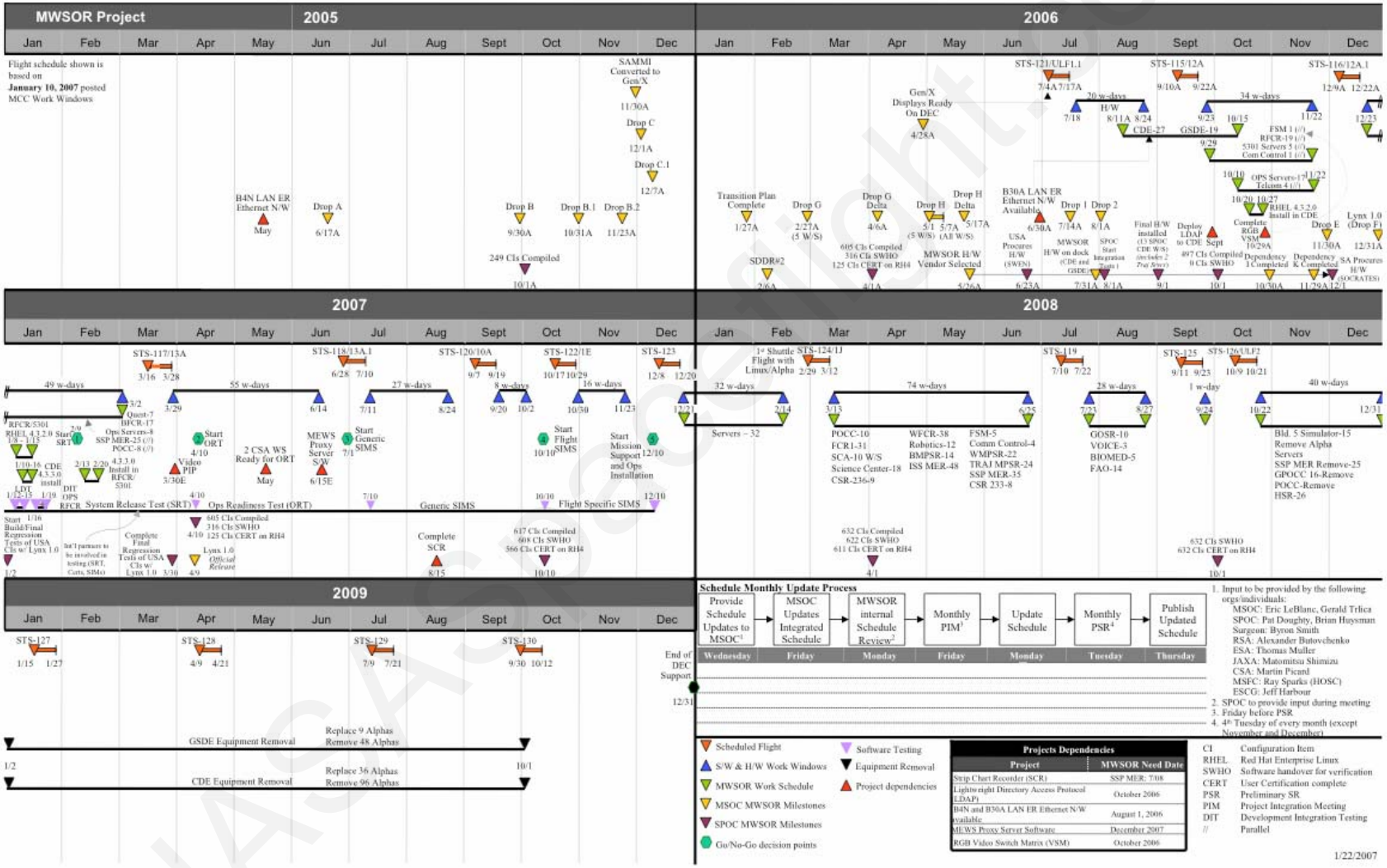
bfcrXX = MCC ws ptr name
BFCR-CSLXXX = INS ptr name



Mission Workstation O/S Replacement



Mission Workstation O/S Replacement



Mission Operations Voice Enhancement

- Agency wide initiative to replace aging voice equipment with state of the art, commercial off the shelf technology
- Standardize equipment around the agency
- Contract finally awarded, following dispute
- JSC has participated in project reviews, requirements reviews, etc
- User input solicited to ensure system will meet the needs of flight controllers
- JSC will receive a prime and backup system for MCC operations
- Working on transition plan to bridge loops from old to new system during installation phase

MOVE Project and JSC-Specific Schedule

ID	Task Name	Start	Finish
362	**DVICE/JSC MOVE Project**	**7/11/06**	**1/26/11**
363	**MOVE Project-Level Activities**	**7/11/06**	**3/21/08**
364	**Support Re-Evaluation Effort**	**7/11/06**	**9/15/06**
365	**Vendor Selection**	**9/22/06**	**9/22/06**
366	**Contract Approval / Negotiations**	**9/25/06**	**10/6/06**
367	**Protest Resolution**	**10/9/06**	**1/15/07**
368	**Re-Negotiations / Team Coordination**	**1/16/07**	**2/1/07**
369	**Contract Start-up**	**2/1/07**	**2/1/07**
370	Project-Level TIM	2/14/07	2/15/07
371	SDR Presentation (Vendor)	3/26/07	3/30/07
372	CDR Presentation (Vendor)	5/7/07	5/11/07
373	First Article Verification (GSFC)	2/4/08	3/21/08
374	**JSC Reviews**	**6/18/07**	**6/23/08**
375	SFDR	6/18/07	6/18/07
376	SDDR #1	8/15/07	8/15/07
377	Final Site Survey & TIM with Vendor	9/26/07	10/2/07
378	Site Architecture Review (SAR) (Vendor)	11/28/07	11/28/07
379	SDDR #2	1/18/08	1/18/08
380	SDDR #3	6/23/08	6/23/08
381	**Vendor Equipment Deliveries to JSC**	**9/4/08**	**4/1/09**
382	Delivery 1 On-Dock (2 Switches, 12 LSAs, 230 Keysets)	9/4/08	9/4/08
383	Delivery 2 On-Dock (305 Keysets)	12/31/08	12/31/08
384	Delivery 3 On-Dock (329 Keysets)	4/1/09	4/1/09
385	**JSC Installation Activities**	**10/10/07**	**2/16/10**
386	**Keyset Cabling Cycle**	**10/10/07**	**10/13/08**
389	**Transition Equipment Cycle**	**1/24/08**	**7/11/08**
394	**MOVE Equipment Cycle**	**6/12/08**	**1/19/10**
395	**Facility Mods**	**6/12/08**	**8/8/08**
398	**Delivery 1 Install/Checkout/Operations**	**9/5/08**	**3/6/09**
403	**Delivery 2 Install/Checkout/Operations**	**1/2/09**	**10/20/09**
407	**Delivery 3 Install/Checkout/Operations**	**4/2/09**	**1/19/10**
411	**JSC MCC Transition Complete**	**2/16/10**	**2/16/10**
412	**JSC DVIS Equipment Removal Complete**	**1/26/11**	**1/26/11**