

Questions:

1. Are you accepting new requirements?

Answer: In general, we are not accepting new requirements since we have completed SRR. Integration of the docking system to individual spacecraft will be worked through the appropriate contract mechanism; please bear in mind that NDS is designed to be a broad solution so individual tailoring will be discouraged.

2. Visiting Vehicles will have different surface area and different clearance needs. In all your docking presentations you show a conical shaped vehicle docking at station, but what about a vehicle with wings (the question is an integrated system question not limited to docking system)?

Answer – The docking system is not affected by vehicle shape (conical or winged vehicle), the real issue is the length of the Common Docking Adapter length on ISS. Most vehicles publically identified for potential mission to ISS to date are conical vehicles. The CDA length is limited by launch vehicle capabilities for delivering CDA to ISS. Greater clearance is highly desirable and the CDA project is looking at how we might extend and provide more clearance, but concepts identified to date all involve launching more hardware which would compete with the basic ISS logistics and science resupply mass. We are working with the one identified wing vehicle to see if the clearance issues by be resolved via appropriate docking system clocking, and we continue to explore possible ways to increase tunnel length to provide additional clearance.

3. Will there be a method to provide comments/concerns on the NDS?

Answer: Potential users are advised to submit comments through the procurement process they are pursuing (e.g., CCDev II).

4. For docking loads, the technical data indicates the lightest vehicle possible is 30,000 lbs, how will lower mass vehicles be accommodated?

Answer: The values documented in our specification are aligned with those in the International Docking System Standard (IDSS). The system performance can accommodate vehicles over a broader range of performance, and there will be an alignment and capture data book that will be available at our CDR.

5. What is the allowable voltage on the pass through power connectors?

Answer: It is up to the host what their pass-through will be. Each umbilical has two strings for power transfer. We carry two 8 gauge wires.

6. Did any of the lessons learned, such as recent problems we had with the Soyuz, cause you to change the design at all? The one that just happened they tried to undock and it did not work, they were able to fix it a day later.

Answer: The most recent issue occurred when they tried to undock and a sensor on the hatch (indicating hatch closed) failed. That sensor turned out to be failed in an open position so the docking mechanism would not activate since it was still seeing the 'hatch is open' message. The operational history of the APAS on ISS has been reviewed, resulting in no specific configuration changes to the NDS.

7. Do you have a 301 that does not have pyrotechnics?

Answer: No, not at this time. The 304 configuration does not have Pyros; however there are number of other performance changes with that configuration that must be considered prior to use.

8. What is the driver for life between 301 and 302 configurations? Is that the seal that is driving that?

Answer: The requirement for -301 is 231 days and 15 years on -302. The primary reason for the longer life on -302 is the sealing surface does not use elastomeric seals.

9. When will CDA be on station?

Answer: 2014 launch

10. The IDSS spec contains a number of TBDs; what is the plan for revising that document?

Answer: The TBDs are planned to be retired over the next several months, with an updated IDD planned for release in April 2010.

11. The power for -301 is specified as 120 volts - what is the energy budget for the operation of the system?

Answer: Nominal power is 200 watt range and a higher peak power for a few seconds.

12. During a previous Hubble repair mission (STS-125), a passive version of the LIDS was installed. Is the NDS system compatible with that hardware?

Answer: No, the Soft Capture System diameter is different for Hubble; the IDSS changed the diameter.

13. Other than docking standard black box will NASA provide docking related items such as targets and communications?

Answer: That question is beyond the scope of this TIM; items such as this will be discussed during appropriate procurement activities.

14. For test and checkout of the docking system, will tools be provided?

Answer: Test sets and GSE software will be available, both to test the vehicle interfaces prior to installing a docking system, and to emulate the mating docking system once installed on the spacecraft.

15. For the ground test check out, will you provide FRAM connectors? Are they long lead connectors?

Answer: Have not decided yet. We will deal with that as each customer enters into a relationship with us in a contract or other means. Yes, they are long lead.

16. When is mass simulator going to be ready?

Answer: In current baseline, planned for late 2012.

17. Is there a 302 simulator planned? So if I convey a need you would come back and give us a timeline?

Answer: Mechanically we will have a fit check tool which will enable you to check any systems to the specs and standards of NDS. On the functional side electrically 301 or 302 are identical so the same GSE emulator set works with both.

18. Will you make available a thermal vacuum chamber for testing?

Answer: You can already negotiate with NASA to use the thermal vacuum chamber here at JSC.

19. Are you going to utilize sensor suites, cameras, Lidar, targets?

Answer: Code ON within the ISS Program Office is currently working to integrate all those items and standardize appropriate items across programs. The NASA policy on these items is under discussion at this time (November 2010)

20. Will CDR cover 301 through 304?

Answer: No, 301 and 302 only.

21. The presentation indicated there will be a CDA deliver to JAXA in 2014, and 2016 is the second delivery – is that correct?

Answer: Yes. The CDA is being initially designed for launch on HTV. Recently, we began work to accommodate the launch on the SpaceX Dragon vehicle as well. The initial CDA will be launched in 2014 on HTV, and if the second unit launches on HTV then launch will be in 2016. The Dragon

opens earlier launch possibilities for the second unit; launch assignment will be part of the normal ISS manifesting process.

22. The schedules do not show production units, are you planning to do proto Qual?

Answer: There will be dedicated articles for NDS Qual; CDA will be proto qual. Production unit availability is subject to final decisions on NASA policy; appropriate procurement activities will specify provisioning of NDS based the results of these policy decisions.

23. With respect to installing the CDA on ISS what is the sequence of deployment if one is delivered in 2014 and there is a wait of a couple of years to deliver the other one? (e.g. does that displace the PMA right away or are you going to park it somewhere and wait till you have two available and then change both?)

Answer: The plan is for the initial launch in 2014 to relocate the PMA that is on Node 2 forward and immediately install a CDA in that location. The second CDA will be installed on Node 2 zenith.

Then for two years you would have two interfaces on station?

Answer: No we would only have one, while we have two PMAs today one of them is in a location that is not usable.

24. Once CDA is installed on ISS how long before you would be able to receive a VV?

Answer: Installation and checkout of the CDA will occur quickly. A lot of work that has been done to minimize the number of EVAs required. The main tasks include removing the grapple fixture and making the electrical connections. The PMAs themselves have external connections that have to be disconnected and reconnected, and a few additional connections unique to the CDA are required.

25. Since the CDA will not have a hatch you have gone through all the emergency egress issues? Whether that is well understood or if there will be additional burden put on the host vehicle or not?

Answer: Since the tunnel is so short to begin with, the CBM hatch on the station side works fine and the VV is going to have a hatch that it is sufficient in terms of dealing with contingencies.

26. Both the IDSS and NDS have retained the APAS keep out zones, but have active mechanical umbilicals for electrical mate; has there been any thought of going to a passive connector mating system like APAS?

Answer: No, we did carefully evaluate the trades and decided to have a separate mechanism. In the APAS design the mechanical actuators are basically screw drives having sufficient force to draw the whole assembly together and overcome the connector friction forces. The NDS system

has electro-magnetic actuators that do not have sufficient mechanical force to overcome all of the forces; this is what drove us to have the separately actuated connectors. We looked hard at that as we would like to eliminate as many moving as possible. Additionally, the IDSS standard requires the connectors to be below the docking plane so that any VV can still dock to any VV, regardless of connector features

27. How long is the CDA tunnel?

Answer: 26.4 inches

28. So it sounds like where we need to go next to get specific details which will depend on the needs of the host. What are the specific needs to make this work, the schedule, and what do we do with the simulators and emulators and testing using your thermal vacuum or whatever, that is what I need next. So what is your advice going forward to get the specifics?

Answer: You will need to go through the various Space Act Agreements and the contracting mechanisms that are out there for commercial crew activities.

29. When will thermal and FEM models be available?

Answer: Both of these models are either complete or near completion and will be available in the near future; we need to get these cleared through the proper technical data process for release.

30. Is there a commitment by other partners to use the IDSS standard; if so what vehicles are planned?

Answer: Several international partners are working on new generation vehicles with plans to use IDSS compatible systems in the long term. It is important if we are going to have an international effort going out beyond low earth orbit to be able to have compatible systems.

31. Is ESA planning to change the ATV?

Answer: There is potential that they could change their vehicle. Like the other partners, whether this happens is a function of the individual national policy approval.