

Minutes, ATSC Technology Group on Distribution

10:00 a.m. – 4:00 p.m., May 31, 2001
National Association of Broadcasters 1771 N Street, Washington, DC

1. Welcome, Introductions and Determination of Quorum

Chairman Ralph Justus (CEA) called the meeting to order at 10:00 a.m. at the headquarters of the National Association of Broadcasters, Washington, D.C. He thanked NAB for hosting the meeting and asked the members in attendance to introduce themselves. The attendance list is given in **Attachment 1**. The Secretary determined that a quorum was present.

2. Approval of Proposed Agenda

Chairman Justus asked for consideration of the draft agenda (**Attachment 2**). Bernard Lechner (consultant) suggested moving item 14b “AdHoc on Code Points” to the discussion of T3/S8 as item 10h. The suggestion was accepted and the agenda was approved as amended.

3. Approval of the Draft Minutes of the April 4, 2001 Meeting

Chairman Justus asked for any corrections to the draft Minutes of the last T3 meeting. Editorial corrections were offered by Art Allison (NAB) and Mr. Lechner. With these changes, the minutes were approved.

4. Opening Remarks

a) Comments by the Executive Director (Mark Richer)

Mark Richer (ATSC) reported on the ATSC annual meeting, held May 23 at CBS Television City in Los Angeles. He said the event went very well, with informative presentations by a number of ATSC contributors. Copies of the presentations will be available for download from the ATSC Web site shortly. He also announced that Richard Chernock (IBM) was named to receive the annual Bernard J. Lechner Award for outstanding technical contributions to ATSC. He said it was a difficult decision because of the large number of hard working individuals currently involved in ATSC standards work.

Mr. Richer also reported on actions taken by the Executive Committee (EC) taken during its meetings on May 21 and May 22 in Los Angeles. He said the EC approved the creation of an Applications Subcommittee with the task of examining business opportunities for digital television and the types of standards that will be required to support those opportunities. The terms of reference for the Applications Subcommittee is given in **Attachment 3**.

Mr. Richer also reported that the EC has named Skip Pizzi as the ATSC liaison to the TV Anytime Forum. Other major items taken up by the EC during its meetings in Los Angeles included incorporation of the ATSC, which has been assigned to an ad hoc group for further consideration, and the path for moving forward on DASE intellectual property issues.

b) Status of Ballots

Mr. Richer briefed the committee on the status of ballots, specifically:

- The Data Broadcast Implementation Guidelines Recommended Practice has been approved by the membership
- Revision A to Amendment 1 of A/65 dealing with Directed Channel Change has been approved by T3
- PSIP for Taiwan has been approved by T3
- Revision to Annex A of A/53 regarding colorimetry has been approved by T3
- IP Multicast Sessions Over Data Broadcast has been approved by T3
- Revision A to A/52 (closes today and is expected to be approved with comments)

Craig Todd (Dolby) reviewed some of the comments received on revision A to A/52, saying there were a few that could be considered substantive. After discussion of the points involved, it was agreed that the comments received were a combination of editorial and—potentially—substantive; i.e., the use of “may” as opposed to “shall” and “may not” as opposed to “shall not,” some of which are a carryover from the original A/52 document. Chairman Justus directed that Mr. Todd, Mr. Allison, and Peter Dare (Sony) serve as an ad hoc comment resolution task force, with the results to be brought back to T3 for final action at its August meeting. Mr. Richer suggested that if the comments are resolved and are deemed to be editorial in nature, which is the privilege of the Executive Director, the document move forward to a ballot of the full membership. Chairman Justus agreed with this approach.

c) Other issues

There were no other issues to report.

5. Brief Reports on Actions from the Previous Meeting

Chairman Justus observed that the relevant items are on the agenda for today's meeting.

6. New Work Items for Discussion

a) Assigned by Executive Committee

Mr. Richer reported that there are no new work items assigned by the EC.

b) Implementation Subcommittee

Mr. Allison reported that the Implementation Subcommittee has been restructured into six major working groups to better address the work being currently done, specifically:

- Closed Captioning Working Group (Gerry Field, chair)
- Data Implementation Working Group (Rich Chernock, chair)
- Systems Evaluation Working Group (Paul Berger, chair)
- RF Issues Working Group (Harvey Arnold, chair)
- Field Interoperability Working Group (George Hanover, chair)
- PSIP Implementation Working Group (Tom Beauchamp, chair)

Mr. Allison said the DIWG committee was used as a template for these organizational changes. He said a Scope of Work is expected from each working group, and that these documents will be distributed prior to the next IS meeting so that formal approval can be sought.

Mr. Dare suggested that ATSC staff should update the Implementation Subcommittee description on the Web site. Mr. Richer agreed that staff would work with Mr. Allison to update the IS page.

c) Other

There were no other items.

7. Report of the Specialist Group on Data Broadcast, T3/S13 (Regis Crinon)

Regis Crinon (Intel) briefed the committee on the activities of T3/S13 (**Attachment 4**). Specific items included the following.

a) Results of Transport Stream File System RFP

Two proposals based on the DSM-CC Object Carousel were received from Philips/Sharp/Canal+/Intel and Strategy & Technology, Ltd. One late proposal was received from Scientific Atlanta. These are now being considered by the specialist group.

b) Data Synchronization

Mr. Crinon reported on progress made within the last couple of months with regard to the acquisition descriptor for asynchronous pre-load data, lifetime of pre-load data once acquired, first occurrence of a synchronized trigger after a PCR discontinuity, and maximum time for decoding a trigger. He said the goal is to have a draft specification ready for consideration by T3 at its August meeting.

Regarding carriage of metadata in MPEG-2 streams, Mr. Crinon stated that T3/S13 has identified a series of issues regarding the current MPEG proposal draft amendment (SC29/WG11/w3845). The T3/S13 specialist group will communicate comments to MPEG before their meeting in July.c) New Work Items

Mr. Crinon reported on a request by SCTE to look into having A/90 support data services up 40 Mbps and signaling of the Data Service Table (DST) size. After consideration, it was concluded by T3/S13 that there is no need to signal the length of the DST (either in PSIP or the System Information). Still, Mr. Allison suggested that revision to the the 40 Mbit/s request facility be made a high priority. Mr. Richer suggested that T3/S13 set a schedule for their activities in this area. He observed that the specialist group has done a good job of meeting its goals.

d) MPEG-2 Liaison

Mr. Crinon reported on document SC 29 N4176 (SC 29/WG11 N4115), a liaison statement from SC29/WG11 (MPEG) to ATSC on the request for proposals for potential revisions to ATSC standards in the area of metadata for advanced EPG

functionality, specifically, "MPEG recognizes that ATSC work falls within the Scope of the MPEG-7 multimedia description scheme activities." As part of its liaison communication, MPEG also provided ATSC with Document SC 29 N3751 (Introduction to MPEG-7, October 2000) and Document SC 29 N4161 (Text of ISO/IEC 15938-5 Final Committee draft, March 2001). Other liaison efforts include the TV Anytime Forum call for proposal for carriage of TV Anytime data in MPEG-2 and IP streams.

Mike Dolan (DIRECTV) suggested that liaison activities be coordinated in that there are a number of liaison efforts within ATSC and that such communications were not always distributed to all interested specialist groups. After some discussion, Chairman Justus asked Mr. Chernock, with support from Mr. Richer and the ATSC staff, to compile a list of current liaison efforts and the individuals involved in such work. It was further agreed that all liaison reports would be distributed to all specialist group chairs.

Mr. Crinon also reported on the status of document A/91, the A/90 Data Broadcast Implementation Guidelines Recommended Practice. The standard has been approved by the ATSC membership and editorial items are now being addressed, with completion expected within the next couple of weeks.

8. Report of the Specialist Group on Satellite Broadcast, T3/S14-A (Dipak Shah)

Dipak Shah (DirecTV) reported on the recent activities of specialist group T3/S14-A (see **Attachment 5**).

a) Report from Joint S8/S14-A Meeting

Mr. Shah summarized the activities of the past two meetings of T3/S14-A (the 12th and 13th meetings), and one joint T3/S8—T3/S14-A meeting held to review and finalized the T3/S14-A Draft Requirements Document (**Attachment 6**). He noted that both figures in the document require several minor corrections and that a typical receiver system is depicted for clarity. He said T3/S14-A does not plan to specify particular functions or interfaces. Mr. Shah reported that his group has commenced the specification development task, with the proposed title "ATSC Technology for Satellite Broadcast Specification." The specification is expected to be a stand-alone document that will reference applicable documents. He said that Standards A/65, A/56, A/80, and the T3/S14-A requirements will serve as the basis for moving forward. Mr. Allison expressed concern regarding the direction of this effort and urged T3 to formally register its judgment regarding the scope of the planned T3/S14-A work. Following some discussion, Chairman Justus directed that these discussions should be handled at the specialist group level.

b) Review Next T3/S14-A Meeting Agenda

Three meetings of T3/S14-A are currently scheduled: June 19 (San Diego), July 26 (Los Angeles); and August 23 (San Diego). Major discussion topics include review of Sections 5.1 (Audio) and 5.2 (Video), and continue discussions on Sections 5.3 (Transport) and 5.4 (PSIP). Chairman Justus thanked Mr. Shah for the work of his specialist group and he urged T3 members interested in these efforts to become involved in T3/S14-A.

The meeting was adjourned for lunch at 12:15 p.m.

The meeting was reconvened by Chairman Justus at 1:00 p.m.

9. Report of the Specialist Group on RF Transmission, T3/S9 (John Tollefson)

a) Status Update

John Tollefson (PBS) reported on developments within specialist group T3/S9 (**Attachment 7**). He reminded the committee that T3/S9 was charged with two tasks: 1) development of an ATSC Recommended Practice on Field Testing (a draft document has been complete and is in the ATSC ballot process), and 2) development of possible enhancements to the DTV transmission standard. He said that responses to the Request for Proposals issued in January 2001 were received from:

ADC
Telecommunications

- Broadcom Corp.
- Conexant Infotainment Systems, Ltd
- Merrill Weiss Group
- NxtWave Communications
- Oren Semiconductor
- Patel-Limberg-McDonald
- Philips
- Sarnoff Corporation
- Zenith Electronics Corporation

Mr. Tollefson said some submissions were very complete, while some were lacking in certain details. He said most are backward-compatible, and most are designed to improve fixed and indoor reception. Some proposals feature varying levels of improvement and compatibility.

Mr. Tollefson said a subgroup of T3/S9, led by John Henderson (Hitachi), is reviewing the proposals concerning the addition of robust streams (NxtWave, Philips, and Zenith) with the goal of developing a single specification. Yian Wu (CRC) is leading a group that is investigating the proposals concerning training sequences (Conexant, Oren, PLM, and Samoff). Another subgroup, led by Victor Tawil (MSTV), is investigating the ADC and Merrill Weiss Group proposals. Charles Einolf (ATTC), is chairing a group on laboratory testing and James Kutzner (PBS) is leading the group designing a field test plan.

The T3/S9 VSB enhancement work plan is as follows:

- 6/06/01 and 6/07/01—respondent presentations and red lines of A/53
- 8/06/01—proof of concept due; laboratory testing begins
- 9/14/01—selection of technologies for field testing; begin documentation of revision(s)
- 11/14/01 through 12/14/01—field testing
- 1/15/02—review field test results
- 1/31/02—T3/S9 decision on revision(s) to Standard(s)

Mr. Tollefson said the work at hand is difficult and detail-intensive. He assured the committee that T3/S9 will work as rapidly as possible, but that time is a serious challenge. He said it was critical for respondents to work together to meet the T3/S9 timeline. Mr. Dare raised the issue of when will this process be completed, and when T3/S9 will know whether the performance improvements proposed actually solve the problems identified at the beginning of the process.

In response to a question from Chairman Justus, Mr. Tollefson said that the funding issues for lab and field testing still need to be resolved. He said this issue is the subject of ongoing discussions.

10. Report of the Specialist Group on Data Multiplex/Transport, T3/S8 (Bernie Lechner)

a) Review of A/55, A/56, A/58, and Annex C to A/53

Mr. Lechner, following up on a report at a previous T3 meeting relating to the use of Standard A/55 by Nagravision, said that further investigation has shown the document should be maintained as an active Standard by ATSC without revision. Document A/56, in concert with SCTE, is being reviewed for consideration of whether changes are required. Work continues on review of document A/58 and Annex C to A/53.

b) Status of Next Corrigendum to A/65A

Mr. Lechner described the progress of work on a corrigendum to A/65A. He said he expects the effort to be completed in time for the next T3 meeting.

c) Status of Work on Content Identification and Replacement of A/57

Mr. Lechner reported on the efforts of a joint T3/S8-SMPTE ad hoc group studying content identification issues. He said the Versioned ISAN (V-ISAN) work continues, with a focus on gaining approval of the group's recommendations document by international standards bodies. He said the ad hoc group is also working on a specification that describes how this information would be transported in an ATSC transport stream.

d) Status of Work on Advanced EPG Functionality

Mr. Lechner provided an update on the advanced EPG functionality RFP. The ad hoc group, chaired by Gomer Thomas (Triveni), has selected a proposal by Sony to use the TV Anytime Forum system as a foundation for further efforts. He said work has begun to define the issues involved.

e) Request to Add Copy Control Descriptor to PSIP

Mr. Lechner reported on the progress of work in T3/S8 to add a copy control descriptor to the A/65 PSIP Standard. He said a requirements document has been developed and work has begun to identify and resolve the key issues involved. Following discussions within the group, a revised requirements document was developed that addresses certain copy control issues. Mr. Lechner said SMPTE has been formally asked to undertake standardization work in this area. Mr. Richer questioned the reason for asking SMPTE to undertake such a role at this time. Explanations were given by Scott Hamilton (News Corp.) and Merrill Weiss (Tribune and SMPTE) on behalf of SMPTE. Mr. Richer suggested that such issues, in the future, should be brought to the T3 level for a decision on how to proceed.

Mr. Allison and others said this issue is time-critical and that the transport issues, which he identified as simple and straightforward, should move forward immediately within ATSC. He said there are no technical issues at dispute.

Mr. Allison **moved** that T3/S8-437 Rev. 1 be balloted for six week period to the T3 membership as an Amendment to ATSC Standard A/65A. **Second** by Mr. Hamilton. Chairman Justus asked Mr. Lechner if the document under

consideration, T3/S8-437 Rev. 1, was a recommendation from T3/S8. Mr. Lechner said that it was still under consideration in the specialist group, which has had some visibility of it but has not formally accepted the document. Chairman Justus offered the view that, because the document has not been officially reported out of T3/S8, it was premature for T3 to consider it.

Chairman Justus asked Randy Hoffner (ABC and T3 vice-chair) to take over as Chairman for a short period of time.

Mr. Justus, speaking as the CEA representative, spoke strongly against the motion on the table. He said this topic was not listed on today's T3 agenda as an item for action, that it unfairly removes T3/S8 from the process, and that it is being unnecessarily rushed through the process. Mr. Allison and Mr. Hamilton responded, saying the document has been available to interested parties for some time. Furthermore, Mr. Hamilton said sufficient members exist to petition T3 for formal action, should that avenue become necessary.

Mr. Lechner said that consensus has not been reached by T3/S8 on moving document T3/S8-437 Rev. 1 forward to T3. Mr. Richer suggested that T3/S8 be instructed, within the next two weeks, to attempt to reach consensus on the document and if they do, to post the revised document to the T3 reflector, and—if there are no substantive issues raised, as determined by the chairman of T3/S8—the document would go to T3 ballot. Mr. Allison countered that the technical issues are straightforward and that there is no need to delay a decision.

Chairman Hoffner called the question. It was **defeated** on a roll call vote. Mr. Hamilton indicated that he had a petition, which was ready for signature by five or more member companies, forcing a T3 vote on this document. Craig Tanner (Sharp) suggested that, rather than force this issue with a petition, the T3 letter ballot on T3/S8-437 as an amendment to A/65A should be made contingent upon reaching a consensus within T3/S8 on this document, as determined by the Chairman of T3/S8, after which it would go to a three week ballot to T3. He suggested the effort at consensus could be dealt with in a teleconference specifically scheduled for that purpose on or before June 15. Mr. Lechner questioned whether a teleconference of T3/S8 would produce a consensus. Mr. Tanner suggested that the two week span before the specialist group teleconference meeting would provide ample time for T3 members to consider the issues involved. He also suggested a shortened ballot period to perhaps three weeks.

Mr. Hamilton offered a motion that essentially implemented Mr. Tanner's suggestion. Specifically, he **moved** that a T3 letter ballot on document T3/S8-437 be authorized as an amendment to ATSC Standard A/65A, contingent upon reaching a consensus of T3/S8 on this document, as determined by the Chairman of T3/S8, after which it will go to a three week ballot of T3. The effort at consensus shall be dealt with in a teleconference specifically scheduled for that purpose on or before June 15. **Second** by Mr. Allison. The motion was **approved** on a roll call vote.

Mr. Richer, acknowledging the high level of interest on this subject, reminded T3 members of the confidentiality rules of ATSC. He said that any release of information on this topic must be cleared through the Chairman of T3 or the Executive Director.

Chairman Hoffner returned the chairmanship of the meeting to Mr. Justus.

f) Application of PSIP to Direct-to-Home Satellite Broadcasting (joint work with T3/S14A)

Mr. Lechner explained the efforts of T3/S8 on this project, summarized in agenda item 8a.

g) PSIP Implementation Guidelines for Broadcasters and Receiver Manufacturers

Mr. Lechner outlined the progress of the PSIP RP Ad Hoc Group, led by Warner Johnston (ABC). The AHG has held several teleconference meetings and is currently working on a draft document that will explain, in a user-oriented fashion, the basic requirements of PSIP at the television station level.

h) Ad Hoc on Code Points

Mr. Lechner said the AHG on Code Points, led by Michael Isnardi (Sarnoff), continues to examine the code points issues as they relate to ATSC and other standards organizations. He said a final report out of the group is expected by the August T3 meeting.

11. Report of the Specialist Group on DASE, T3/S17 (Glenn Adams)

a) DASE Parts 1-5 Ballot Comment Resolution Status

Glenn Adams (XFSI) reported on the comment resolution process for DASE Parts 1 through 5 now underway in T3/S17. He said that because of the large number of comments received (approximately 350 in all), the work will require more time than was originally thought.

b) DASE parts 6-8 Status

Mr. Adams said that progress has been made on Part 6, but that Parts 7 and 8 are still works in progress. He said these documents have been slowed because of considerable modifications to the security module.

c) T3/S17 Charter Review Status

Mr. Adams reported that the T3/S17 specialist group is currently viewing its terms of reference, with an eye toward moving beyond DASE-1.

d) DASE-2 Activity Status

Mr. Adams said T3/S17 is currently working to define how it will move forward with DASE Level 2, and the timeframes that might be involved.

Chairman Justus invited questions on the T3/S17 report. Mr. Dolan reported that NIST has undertaken a test implementation JavaTV. Mr. Richer reminded T3 members that verification of DASE operability is a requirement, based on a motion approved at the February 13, 2001, meeting. He said this process needs to be defined with greater specificity.

Mr. Richer also reported on a recent meeting of the EC regarding DASE intellectual property (IP) issues. The outcome of the meeting was to focus on key issues on the table through an ad hoc group chaired by Mr. Hoffner. The major issue of discussion is whether it is acceptable for a normative reference in an ATSC Standard to be accessible only behind a “click-through” license. This AHG was directed to report back to at the next scheduled EC meeting (June 27).

12. Report of the Specialists Group on Transport Independent Transactional Services, T3/S16 (Rich Chernock)

a) New Name

Mr. Chernock outlined the reasons for changing the name of the specialist group from Interactive Television to Transport-Independent Transactional Services, which more accurately reflects the work that the group will undertake. Mr. Richer suggested that the name of the specialist group be renamed simply “Transactional Services.” This suggestion was accepted by Mr. Chernock and T3.

b) Scope Discussion

Mr. Chernock outlined the proposed scope of T3/S16, specifically:

“The primary objective of T3/S16 is to provide network-independent transactional capability for the ATSC digital television system. This roughly maps to describing the *Session layer* of the ISO seven layer networking model. The specialist group will not define the human interface, but instead describe the establishment of a connection so that a transaction of some sort (i.e., an exchange of data) back to a defined entity—specified by the application—can take place. The purpose of enabling such transactional capabilities is to facilitate applications such as payment for specific services (e-commerce), printing of coupons, and reporting of consumer responses.”

Chairman Justus accepted the scope and urged the specialist group to move forward.

c) Work Plan

Mr. Chernock reported that a problems statement is the next area of activity for T3/S16, followed by a canvas of related work in this area by other organizations. The next meeting is a teleconference on June 11. Mr. Chernock said he expected to have a more detailed work plan following the next teleconference.

Chairman Justus asked Mr. Adams to closely monitor the work of T3/S16 to ensure a cooperative environment with the DASE efforts of T3/S17.

13. Application Reference Model Group, T3/S18 (Mike Dolan)

Mr. Dolan explained that T3/S18 was recently formed out of the S17/ARM Team (**Attachment 8**). The purpose of this group is to develop a receiver model and transport bindings that enable application environments, specifically the DASE AEE and PE environments, and to produce a technical recommendation to T3. The specialist group will build on existing standards and work in process, and interface closely with other data specialist groups.

a) Review of Scope

The scope of T3/S18 is as follows: 1) to develop all necessary ATSC Data Service Description Framework and PSIP transport mappings and extensions, 2) define an Application State Model—limited to transport signaling and channel changes, 3) define Application Data Models and develop their transport encapsulations, 4) develop Data Buffer Models for all required encapsulations, and 5) develop a Resource Naming System.

b) Status of related T3/S17 team work

Mr. Dolan reported that T3/S18 is working closely with the DASE effort in T3/S17. Other ongoing liaison efforts include T3/S8, T3/S13, and IS/DIWG.

c) Plan for Document Development

Mr. Dolan reported that T3/S18 plans to draft one or more technical documents for consideration by ATSC, the scope of which is still to be determined.

14. Other Business

a) Ad Hoc on Collision Avoidance

Mr. Chernock outlined the issues that the Ad Hoc Group on Collision Avoidance are studying, specifically how to deal with collision problems when private fields/ranges are used in ATSC streams. Prior to today's T3 meeting, he distributed two documents on the subject (**Attachment 9** and **Attachment 10**), which present a proposed solution to this problem and which would involve an amendment to A/65 and/or A/53. Mr. Chernock invited comments from T3 on the documents, but reminded the group that the documents are not yet final. He explained that the problems being addressed by his AHG are not limited to ATSC and suggested that liaison with DVB on this matter would be appropriate. Mr. Chernock said he expects the documents to be ready for formal consideration by T3 at the August meeting.

b) ATSC reflector and FTP site (Jerry Whitaker)

T3 Secretary Jerry Whitaker (ATSC) outlined the ongoing work on the ATSC reflector and other issues relating to document distribution. He said that about half of the specialist groups have been moved to the new reflector, with the remainder scheduled for transfer in June.

Mr. Whitaker raised the question of document security on the ATSC FTP site. An ad hoc group consisting of Messrs Whitaker, Dolan, Chernock, and Adams was formed to consider the problem and potential solutions.

15. Schedule of Next T3 Meeting

The next meeting of the Technology Group on Distribution is set for August 8, 2001, at NAB, Washington, D.C. Other meetings include October 3, 2001, PSB Braddock Place; and December 5, 2001, in the Washington, D.C area. Note that the previously scheduled T3 meeting on November 28 was moved to December 5 to avoid a conflict with the Western Cable Show.

Chairman Justus also said that preliminary planning for the 2002 T3 meeting schedule will occur within the next couple of months, and he asked for feedback from members on potential conflicts.

16. Adjournment

The meeting was adjourned at 4:10 p.m.

Attachments

See the ATSC Web page www.atsc.org/sg/T3/May_31_2001/Attachments

Attachment 1: Attendance List

http://www.atsc.org/sg/T3/May_31_2001/Attachments/Attachment_1_Attendance_list.pdf

Attachment 2: Draft Agenda

http://www.atsc.org/sg/T3/May_31_2001/Attachments/Attachment_2_Draft_T3_Agenda_May_31_01.pdf

Attachment 3: Application Subcommittee Terms of Reference

http://www.atsc.org/sg/T3/May_31_2001/Attachments/Attachment_3_Applications_Subcommittee.pdf

Attachment 4: T3/S13 Status Report

http://www.atsc.org/sg/T3/May_31_2001/Attachments/Attachment_4_S13report_May_2001.pdf

Attachment 5: T3/S14A Status Report

http://www.atsc.org/sg/T3/May_31_2001/Attachments/Attachment_5_T3Report053001.pdf

Attachment 6: Draft Requirements for DTH Satellite Broadcast

http://www.atsc.org/sg/T3/May_31_2001/Attachments/Attachment_6_T3S14A_019R7.pdf

Attachment 7: T3/S9 Status Report

http://www.atsc.org/sg/T3/May_31_2001/Attachments/Attachment_7_T3S9Report5_31_01.pdf

Attachment 8: T3/S18-ARM Status Report

http://www.atsc.org/sg/T3/May_31_2001/Attachments/Attachment_8_ARM009R0_Status.pdf

Attachment 9: Document T3/S8-420r2

http://www.atsc.org/sg/T3/May_31_2001/Attachments/Attachment_9_T3S8420r2.pdf

Attachment 10: Document T3/S8-441r1

http://www.atsc.org/sg/T3/May_31_2001/Attachments/Attachment_10_T3S8441r1.pdf