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EX PARTE OR LATE FILED

January 19, 1999

Magalie Roman Salas
Secretary
Federal Communications Commission
TW-A 325
445 12th Street, SW
Washington, DC 20554

Re: *Ex parte* contacts in CS Docket No. 98-120

Dear Secretary Salas:

On January 19, 1999, the undersigned, along with Tom McMahon and Patrick Griffis of Microsoft Corporation, met with Jon S. Wilkins, Alan Stillwell, Jonathan D. Levy, Dale N. Hatfield, Robert Pepper, R. Darryl Cooper, Deborah E. Klein, Ron Parver, Mike Lance, Tom Moran, John Wong, and Roger Holberg to discuss the above-referenced docket. The discussion focused on handouts reflecting Microsoft's position on digital must-carry issues. Copies of those handouts are attached hereto.

The original and one copy of this letter are being filed with the Commission for inclusion in the record of the above-referenced docket.

Sincerely,

Kevin S. DiLallo

cc: Jon S. Wilkins
Alan Stillwell
Jonathan D. Levy
Robert Pepper, Ph.D.
Dale N. Hatfield
R. Darryl Cooper
Deborah E. Klein
Ron Parver
Mike Lance
Tom Moran
John Wong
Roger Holberg

MICROSOFT CORPORATION

***EX PARTE* PRESENTATION IN**

CS DOCKET NO. 98-120,

Carriage of Transmissions of Digital Television Broadcast Stations --

Amendments to Part 76 of the Commission's Rules

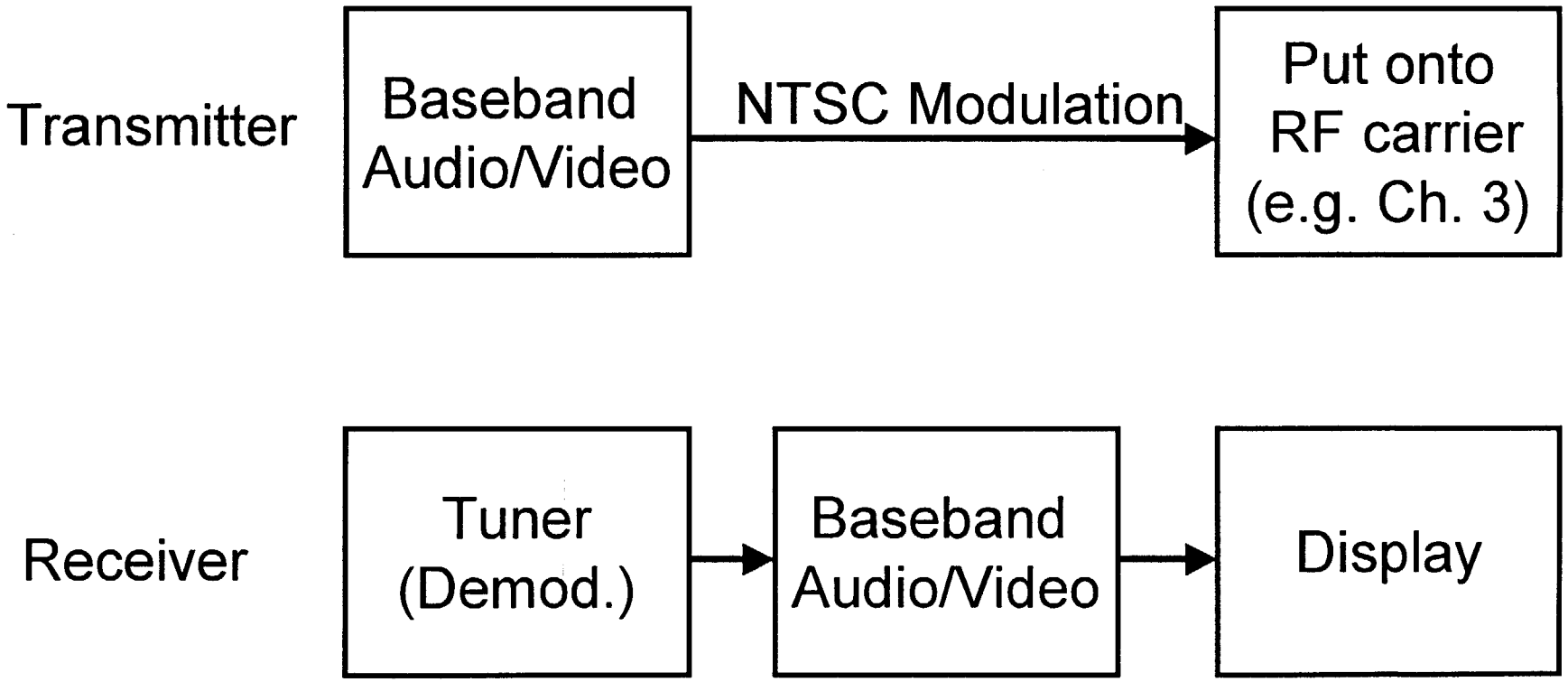
January 19, 1999

Carriage of Transmissions of Digital Broadcast Stations,

CS Dkt. No. 98-120

Comparison of Analog v. Digital End-to-End System

ANALOG



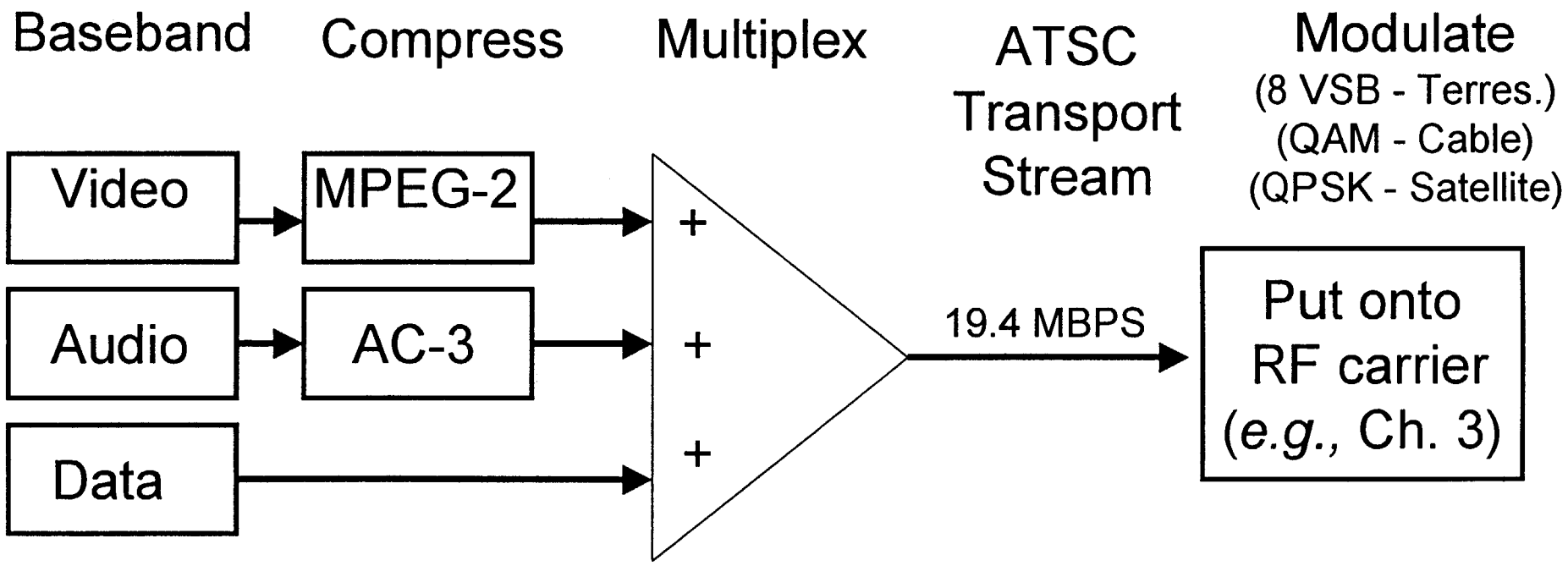
Microsoft Corporation, January 19,1999

Carriage of Transmissions of Digital Broadcast Stations,

CS Dkt. No. 98-120

Comparison of Analog v. Digital End-to-End System

DIGITAL: TRANSMISSION



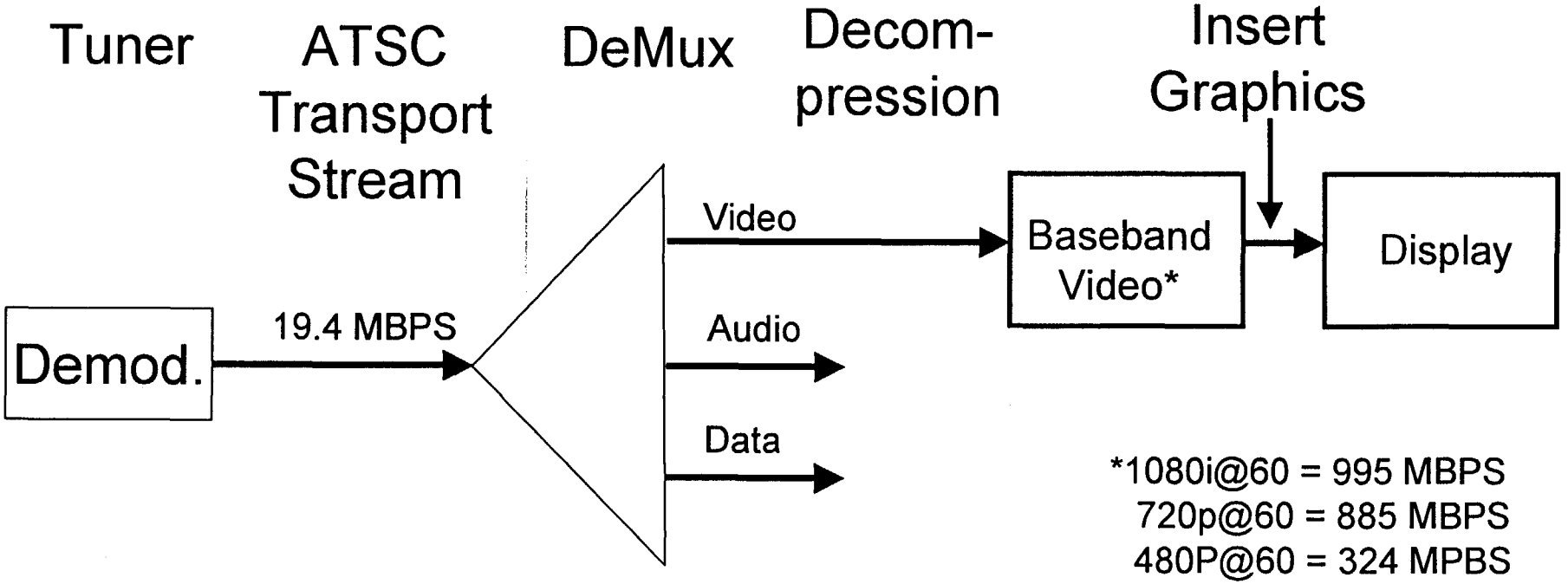
Microsoft Corporation, January 19,1999

Carriage of Transmissions of Digital Broadcast Stations,

CS Dkt. No. 98-120

Comparison of Analog v. Digital End-to-End System

DIGITAL: RECEIVER



*1080i@60 = 995 MBPS
720p@60 = 885 MBPS
480P@60 = 324 MPBS

Microsoft Corporation, January 19,1999

ATSC PICTURE FORMATS:
A Hierarchy of Pixels & Bit Rates

Active Lines	Pixels per Line	Total Pixels per Frame	Bit Rate/Picture Rate* 60P	60I/30P	24P	Notes
1080	1920	2,073,600	---	995	796	16:9 only
720	1280	921,600	885	442(P)	334	P/16:9 "
480	704	337,920	324	162	130	16:9/4:3
480	640	307,200	295	148	118	4:3 (VGA)

Vertical Sampling

Horizontal Sampling

Higher → Lower

Temporal Sampling

* Uncompressed payload in MBPS (8 bit 4:2:2 sampling)

P. Griffis, Microsoft Corporation, January 19, 1999

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WHY VIDEO COMPRESSION MATTERS

- Differences in bit rates
- Bit rate limits of interface standards
- Mixing video with graphics to create a rich Internet experience
- Use of intelligent set-top boxes

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FUNDAMENTAL TRUTHS ABOUT COMPRESSED DIGITAL VIDEO

1. **Uncompressed video requires up to 60 times the bit rate of compressed video.**

   For example, when uncompressed, the following formats require the indicated bit rates:

   - **1080i at 30 fps = 995 Mbps**
   - **720p at 60 fps = 885 Mbps**
   - **480p at 60 fps = 324 Mbps**

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FUNDAMENTAL TRUTHS ABOUT COMPRESSED DIGITAL VIDEO *(cont'd)*

2. Video must be uncompressed in two instances:*

   a. to enter the display device, *i.e.,* CRT, and

   b. to combine the video with graphics

   * This is why CEMA has proposed that the digital television perform both functions.

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FUNDAMENTAL TRUTHS ABOUT COMPRESSED DIGITAL VIDEO *(cont'd)*

3. Once video is uncompressed (*e.g.,* in an ASTB), there are two options:

   a. Deal with the uncompressed bit rate and associated megapixel processing complexity and cost; *or*

   b. Re-compress the video and re-synchronize it with audio and data to recreate the transport stream.

      - These functions are complicated and should be avoided to minimize system cost -- MPEG encoding is some 100 times more complex than decoding.

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COMPLEXITIES IN USING ASTBs

- **If placed before display device, ASTB will need to:**

  (1) decode video to baseband;

  (2) add graphics (*e.g.*, HTML content); and

  (3) re-encode signal to send it to DTV receiver.

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COMPLEXITIES IN USING ASTBs
(*cont'd)*

- ASTB must re-encode outgoing signal because bit rate of uncompressed signal would far exceed maximum bit rate of EIA-775, DTV 1394 Interface Specification.
  - Max. bit rate of 1394 Spec is 200 MBPS; more costly versions of 1394 support 400 and 800 MBPS, but not in EIA-775 Spec.
  - DTV 1394 Interface Spec is suitable for its intended purpose, where video and audio are decoded in DTV receiver.
  - DTV 1394 Interface Spec was not designed to allow ASTB to combine video & audio with enhanced Internet graphics.

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COMPLEXITIES IN USING ASTBs (*cont'd)*

- **Absent universal digital content access, ASTB will need to interface with the set-top the cable or DBS system uses.**
- **FCC's *Navigation Devices* Order may partially address universal content access issue.**
- **Commission should consider effect of *Navigation Devices* Order on rollout of DTV and use of ASTBs to enhance DTV experience.**

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