Based on a needs assessment of intra-state and inter-state interconnection telecommunication services, the Virginia Public Telecommunications Council (VPTC) envisions a public service satellite system consisting of: (1) primarily broadband transceiver capacities to areas having state supported institutions of higher education, perhaps with common carrier supplied narrow-band extensions to various state agencies; and (2) narrow-band transceiver capacities located in areas lacking institutions of higher education but having a School Division Headquarters, with narrow-band extensions (common carrier supplied) to various state agencies. This system would interconnect directly with compatible transceivers within satellite range. Traffic protocols would be centrally managed from Richmond and coordinated with the national satellite operating authority. (DAG)
NEW INTERCONNECTION TELECOMMUNICATIONS NEEDS IN VIRGINIA

After conducting a Needs Assessment of intra-state and inter-state interconnection telecommunications services which are, or should come to be, required by the numerous State agencies and institutions, the VPTC can summarize its tentative findings* as follows:

*Largely excluded from this summary are conventional voice-grade CCO-supplied services except slow-speed data and facsimile transmission.
BROADBAND SERVICES (In Priority Order)

Administrative Audio-video Conferencing and Interviewing

Virtually all State Agencies and institutions, especially those having field offices, installations or activities or those having significant inter-state contacts

Audio-video Instructional Programming

Higher Education* (Internal and via ETV)
Public Education (via ETV)
State Personnel Training (especially through State Personnel System)

High-speed Data (Including parallel telemetry signals)

Higher Education (Administrative, Research, CMI)
ADF (Acting for other agencies and institutions)
Highway (Traffic Counting and structural stress monitoring)
Environmental Agencies (Air and Water Monitoring)
Medical Institutions (Diagnostic Examinations)

High-speed Facsimile

Higher Education - Libraries
Certain agencies and institutions having field offices, installations or activities near appropriate facilities
ETV Entities (Curricular guides and psychometric instruments)

*Includes Medical, Dental and Nursing; pre-service and in-service.
Public Television Networking

All ETV Entities (5-6 sites)

Video Site Monitoring (Only where feasibly extendable)

Environmental Agencies (Smoke Abatement, etc.)
Highway Department (Traffic Flow)
Forestry (Fire Monitoring)
Engineering and Buildings (Construction status compilations on VTR)
NARROWBAND SERVICES (In Priority Order)

**Slow-speed Data**

Virtually all agencies and institutions having field offices, installations or activities

ADP (Acting for other agencies and institutions)

**Alert and Alarm Signaling** (Separate from CCO Systems)

State Police

Office of Emergency Services (Civil Defense)

Highway Department (Traffic Interruptions)

**Emergency Voice Networking** (Separate from CCO Systems)

State Police

Office of Emergency Services (Civil Defense)

Highway Department (Traffic Interruptions)

**Telemetry Signaling**

Highway (Traffic counting and structural stress monitoring)

Environmental Agencies (Air and Water Monitoring)

Medical Institutions (Diagnostic Examinations)

**Servo Control Signaling**

Highway Traffic Control (Computerized or manual)
NARROWBAND SERVICES - (Continued)

Slow-speed Facsimile

Virtually all agencies and institutions having field offices, installations or activities

Public Radio Networking

All Public Radio Stations (10 Sites - Voice grade only)

Instructional Programming (Audio and/or Slow scan Video)

Higher Education (Internal and via radio)

Public Education (Largely via radio)

State Personnel Training (especially through State Personnel System)

Administrative Audio Conferencing

Virtually all agencies and institutions

Aural Monitoring

Environmental Agencies (Noise Control)

Video Site Monitoring (Slow scan)

Environmental Agencies (Smoke abatement, etc.)

Highway Department (Traffic Flow)

Forestry (Fire Monitoring)
We envision in Virginia a PUBLIC SERVICE SATELLITE SYSTEM which consists of:

(a) primarily, broadband transceiver capacities in those 31 Virginia "locality clusters" having state-supported institutions of higher education, perhaps with common-carrier-supplied (or radio-spectrum) narrow-band extensions to each nearby School Division Headquarters, DMV local office, Highway Department Depot, State Hospital facility, local hospital, Corrections installation, Health Department Office, Welfare Office, Environmental Monitoring facility, Employment Office, Public Telecommunications Entity*, public radio station**, State Police Headquarters as well as the principal sites of local government and local law enforcement administration. In those 8 localities where there are several institutions of higher education in close vicinity, broadband links can be used to inter-connect them with the nearby transceivers. (There are 16 such installations in all).

(b) perhaps also, narrow-band transceiver capacities in all or certain of those 52 Virginia "locality clusters" lacking an institution of higher education but having a School Division Headquarters with common-carrier-supplied (or radio spectrum) narrow-band extensions to each nearby DMV local office, Highway Department Depct, State Hospital facility, local hospital, Corrections installation, State-owned radio station, Health Department Office, Welfare Office, Environmental Monitoring facility, Employment Office, State Police Headquarters as well as the principal sites of local government and local law enforcement administration.

*The five regional Public Telecommunications Entities would actually provide suitable broadband links from their Master Control Rooms to and from the closest transceiver sites.

**Similarly, CPB-qualified public radio stations in Richmond, Norfolk, Roanoke, Harrisonburg and Fairfax would provide high-fidelity, audio-bandwidth links to and from their own Control Rooms.

N.B. Broadband and/or narrowband extensions could also often be accomplished through local CATV systems.
The regional **multiplexing broadband facilities** would be employed to receive, send and relay duplexed video (cinematized), high fidelity or voice-grade audio (including various slow-scan video formats), high-speed and slow-speed data (including facsimile, telemetry, servo and alarm signals).

The local **limited-multiplexing narrowband capacities** would be employed to receive, send and relay duplexed voice-grade audio (including certain slow-scan video formats) and slow-speed data (including facsimile, telemetry, servo and alarm signals).
BTP terminal systems would include:

- Video Monitors and/or recorders
- High-fidelity Audio Monitors and/or recorders
- High-speed Facsimile Print-outs and/or copiers
- High-speed Computer Inter-faces
- Parallel Telemetry Mechanisms and recorders

NTP terminal systems would include:

- Slow-scan Video Monitors and/or recorders
- Audio Monitors and/or recorders
- Slow-speed Facsimile Print-outs and/or copiers
- Slow-speed Computer inter-faces (including Teletypewriters)
- Alarm Mechanisms
- Telemeters and/or signal recorders
- Servo Control Mechanisms

Concomitant Origination Systems would include:

- Video Cameras and Mixers
- Audio-video recorders/playback machines
- Microphones and Audio Processors/Mixers
- Audio recorder/playback machines and Rate Change Devices
- Facsimile Encoders (Micro-form and other)
- Teletypewriters
- Keypunchers and Readers
- Cathode-ray writers and similar electro-optical device systems
- Data recorder/playback machines
- Environmental Sensors and Meters (Heat Light, Chemical, etc.)
- Stress and pressure sensors and meters
- Signal Activators (Manual and programmed)
- Computers (Digital or Analog)
- Medical Sensor Instruments
The envisioned broadband interconnection system would likely require:

(a) 2 hours of broadband single-channel service between 8 a.m. and 5 p.m. each workday.

(b) 2 hours of broadband single-channel service between 5 p.m. and 11 p.m. each weeknight.

(c) 2 hours of broadband single-channel service between 11 p.m. and 8 a.m. each day.

If double-channel broadband capacities were made available, overall time requirements might be halved.

Broadband requirements would be:

(a) 24 hour instant access to an emergency channel

(b) 10 minutes per hour on a data conditioned channel (to be used largely in a polling, share-time mode for critical update relaying)

(c) 2 continuous hours in the 8 a.m. - 5 p.m., 5 p.m. to 11 p.m. and 11 p.m. to 8 a.m. time periods each day.

(d) 1 minute in every 5 for relay of telemetered data on a conditioned channel (to be used in a polling, share-time mode)

All figures are minimums.

NOTE: It is presumed that Narrowband facilities would be devised and used only where, and to the extent that, CCO-supplied circuits or conventional microwave or radio links are unavailable, more expensive, significantly less reliable, or technically inferior.
The envisioned intra-and-inter-state Interconnection System should be designed to allow any Virginia Transceiver to interconnect directly with any other technically compatible transceiver within satellite range but under strict traffic protocols which are managed from a central organizational point in Richmond and which are in turn fully integrated with overall traffic configurations determined by the national satellite operating authority.
The VPTC believes that there is strong merit in the concept that the five Public Telecommunications Entities in Virginia become jointly the principal intra-state operators of the public service satellite system elements described herebefore, interfacing them where logical with CCO and state-owned radio-spectrum or computer facilities. Such an arrangement might best be effected by having the entities incorporate with the VPTC (acting on behalf of the Commonwealth government) as an ADDED VALUE NETWORK ORGANIZATION (AVNO). In this way, the interconnection system would be "synergized" through the regular accessing of media production, storage, maintenance, design, and management resources. The AVNO, centered at Richmond, would be responsible for clearing and implementing all intra-state and inter-state switching protocols with the national satellite operating organization.
Probable BROADBAND TRANSCEIVER POINTS ("Locality Clusters" Showing Community College, College, University Campuses, and Telecommunications Entities Within)

<table>
<thead>
<tr>
<th>Number</th>
<th>Location</th>
<th>Entities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Richmond</td>
<td>U(2) + CC(2) + WCVE/WCVW + FM</td>
</tr>
<tr>
<td>2</td>
<td>Norfolk</td>
<td>U + C + CC(3) + WHRO + FM</td>
</tr>
<tr>
<td>3</td>
<td>Wallops Island</td>
<td>CC</td>
</tr>
<tr>
<td>4</td>
<td>Newport News*</td>
<td>C + CC</td>
</tr>
<tr>
<td>5</td>
<td>Franklin</td>
<td>CC</td>
</tr>
<tr>
<td>6</td>
<td>Gloucester County*</td>
<td>(Glenns) CC</td>
</tr>
<tr>
<td>7</td>
<td>Williamsburg</td>
<td>C</td>
</tr>
<tr>
<td>8</td>
<td>Richmond County (Warsaw)</td>
<td>CC</td>
</tr>
<tr>
<td>9</td>
<td>Dinwiddie County (Petersburg)</td>
<td>C + C + CC</td>
</tr>
<tr>
<td>10</td>
<td>Alberta</td>
<td>CC</td>
</tr>
<tr>
<td>11</td>
<td>Farmville</td>
<td>C</td>
</tr>
<tr>
<td>12</td>
<td>Keysville*</td>
<td>CC</td>
</tr>
<tr>
<td>13</td>
<td>Fredericksburg</td>
<td>C + CC</td>
</tr>
<tr>
<td>14</td>
<td>Fairfax (Annandale)</td>
<td>CC(3) + U + WNVT + FM</td>
</tr>
<tr>
<td>15</td>
<td>Loudon County (Leesburg)*</td>
<td>CC</td>
</tr>
<tr>
<td>16</td>
<td>Middletown</td>
<td>CC</td>
</tr>
<tr>
<td>17</td>
<td>Harrisonburg</td>
<td>C + WVPT + FM</td>
</tr>
<tr>
<td>18</td>
<td>Augusta County (Weyers Cave)*</td>
<td>CC</td>
</tr>
<tr>
<td>19</td>
<td>Charlottesville</td>
<td>U + CC</td>
</tr>
<tr>
<td>20</td>
<td>Lexington</td>
<td>C</td>
</tr>
<tr>
<td>21</td>
<td>Clifton Forge</td>
<td>CC</td>
</tr>
<tr>
<td>22</td>
<td>Danville</td>
<td>CC</td>
</tr>
<tr>
<td>23</td>
<td>Lynchburg</td>
<td>CC</td>
</tr>
<tr>
<td>24</td>
<td>Roanoke</td>
<td>CC + WBRA/WSVN + FM</td>
</tr>
<tr>
<td>25</td>
<td>Abington</td>
<td>CC</td>
</tr>
<tr>
<td>26</td>
<td>Wise</td>
<td>C (+ WSVN?)</td>
</tr>
<tr>
<td>27</td>
<td>Richlands</td>
<td>CC</td>
</tr>
<tr>
<td>28</td>
<td>Wytheville</td>
<td>CC</td>
</tr>
<tr>
<td>29</td>
<td>Blacksburg*</td>
<td>U + C</td>
</tr>
<tr>
<td>30</td>
<td>Dublin*</td>
<td>CC</td>
</tr>
<tr>
<td>31</td>
<td>Martinsville</td>
<td>CC</td>
</tr>
</tbody>
</table>

*These seven points might be combined with others, reducing the number of BTPs to 24.
Possible, additional Narrowband Transceiver Points ("Locality Clusters")

(It is likely that transceivers will not be needed at all points identified below)

1 - Northampton County
2 - Suffolk
3 - Isle of Wight County
4 - Surry County
5 - Lancaster – Northumberland Counties
6 - King and Queen – Middlesex Counties
7 - Sussex County
8 - Essex County
9 - Westmoreland County
10 - King George County
11 - Caroline County
12 - Hanover County
13 - Greensville County
14 - Mecklenburg County
15 - Nottoway County
16 - Amelia County
17 - Powhatan County
18 - Goochland County
19 - Louisa County
20 - Fluvanna County
21 - Buckingham County
22 - Appomattox County
23 - Charlotte County
24 - Halifax County
25 - Franklin County
26 - Patrick County
27 - Floyd County
28 - Carroll County
29 - Grayson County
30 - Smyth County
31 - Scott County
32 - Lee County
33 - Russell County
34 - Dickenson County
35 - Buchanan County
36 - Bland County
37 - Giles County
38 - Craig County
39 - Bedford County
40 - Botetourt County
41 - Amherst County
42 - Nelson County
43 - Cumberland County
44 - Bath County
45 - Highland County
46 - Madison County
47 - Page County
48 - Shenandoah County
49 - Warren-Rappahannock Counties
50 - Culpeper County
51 - Stafford County
52 - Fauquier County

- 17 -

- 14 -
PHASING PRIORITIES

Assuming the demonstrated cost-effectiveness of the capacities and facilities to be involved at each installation phase, the VPTC tentatively anticipates the following priority schedule for the development of the interconnection system envisioned:

(a) Main BTP at Richmond interconnected through satellite to comparable State BTPs elsewhere (but especially in the East) and BTPs at Norfolk, Roanoke and Fairfax (4 BTPs)
(b) BTPs at Harrisonburg and Wise (2 BTPs)
(c) BTPs at Danville, Fredericksburg, Wallops Island, Williamsburg, Farmville, Abingdon, and Charlottesville (7 BTPs)
(d) BTPs at Franklin, Warsaw, Petersburg, Alberta, Middletown, Lexington, and Wytheville (7 BTPs)
(e) BTPs at Clifton Forge, Lynchburg, Richlands, Martinsville, Blacksburg*, Newport News*, and Leesburg* (4-7 BTPs)
(f) BTPs at Keysville*, Weyers Cave*, Dublin* and Glens* (up to 4 BTPs)
(g) NTPs at Greensville County, Halifax County, Lee County, Highland County, Louisa County, Culpeper County, Grayson County, Lancaster-Northumberland Counties (8 NTPs)
(h) Other NTPs as required (up to 44 NTPs)

*Engineering studies might obviate need for these BTPs by extending broadband services from other locality clusters nearby.
AGENCIES DIRECTLY PARTICIPATING IN NEEDS ASSESSMENT SURVEY
OF NEW INTERCONNECTION SERVICES

Division of State Planning & Community Affairs
State Water Control Board
Office of Emergency Services
Council On Higher Education
Department of Highways & Transportation
Division of Automated Data Processing
Air Pollution Control Board
State Library
Department of Health
Department of Purchases & Supply
Department of Community Colleges
Highway Safety Division
State Corporation Commission
Department of Mental Health & Mental Retardation
Department of Corrections
Department of Welfare
Division of Motor Vehicles
Department of Education
Division of Engineering & Buildings
Employment Commission
Virginia Institute of Marine Science
State Police
State Forestry Service
VPI & State University
Medical College of Virginia - Health Science Division
AGENCIES DIRECTLY PARTICIPATING IN NEEDS ASSESSMENT SURVEY

University of Virginia
University of Virginia Hospital
Central Virginia ETV Corporation
Shenandoah Valley ETV Corporation
Blue Ridge ETV Association, Incorporated
Hampton Roads ETV Association, Incorporated
WVWR - FM Radio
WRFK - FM Radio
WMRA - FM Radio

Common Carrier Telephone Companies of Virginia