

An application of the Department of Public Safety, Division of State Police, for a Certificate of Environmental Compatibility and Public Need for the construction, operation, and maintenance of a telecommunications tower and associated equipment in the Town of Wilton, Connecticut. : Docket 128 : Connecticut Siting Council : April 30, 1990

FINDINGS OF FACT

1. The Department of Public Safety, Division of State Police (State Police), in accordance with provisions of sections 16-50g to 16-50z of the Connecticut General Statutes (CGS), applied to the Connecticut Siting Council (Council) on September 29, 1989, for a Certificate of Environmental Compatability and Public Need (Certificate) for the construction, maintenance, and operation of a telecommunications tower, associated equipment, and a building in the Town of Wilton, Connecticut, to provide telecommunications service within Fairfield County. (Record)
2. The application was accompanied by proof of service as required by section 16-50l of the CGS. (Record)
3. Affidavit of newspaper notice as required by section 16-50l of the CGS was supplied by the applicant. (Record)
4. The Council and its staff inspected the proposed site in the Town of Wilton, Connecticut, on December 19, 1989. (Record)
5. Pursuant to section 16-50m of the CGS, the Council, after giving due notice thereof, held a public hearing on this application on December 19, 1989, at 4:30 P.M. in the Wilton Town Hall Annex and continued at 7:00 P.M. in the Wilton High School Gymnasium in Wilton, Connecticut. (Record)
6. The parties to the proceeding are the applicant and those persons and organizations whose names are listed in the Decision and Order which accompanies these findings. (Record)

Existing State Police Radio System

7. The State Police currently utilize a communications system originally designed in 1940 to service 290 troopers. The current system's inadequacies include: a) the inability to provide statewide coverage, b) co-channel interference, and c) a lack of communications between State police and other State/local agencies during emergencies and disasters. (State Police 1, pp.5-2 and 9-3)

8. The current point-to-point communications services are provided by leased telephone landlines and 960 MHz point-to-point links. The two-way mobile radio is a low-band VHF, voice only, simplex system. (State Police 1, pp.8-1 and 8-2; State Police 2, Q.4)
9. The existing State police communications system has been used for over 40 years without major modifications. The procurement of new equipment components or application of new technologies to the existing system cannot upgrade the existing system to meet present or future demands. (State Police 1, p.8-3)
10. The existing 960 MHz point-to-point link and the leased landlines have no advantages of speed, system expansion, or intelligent networking. Leased telephone landlines experience unacceptable delays of full service while circuit failures are being restored. Specific problems with the existing network include: a) the inability to arrange the system for tactical and other emergency situations, b) inherent noise levels, c) frequent circuit failures, and d) vegetation absorption and defraction losses to radio energy of the 960 MHz link. (State Police 1, pp. 5-2, 5-3, and 9-1; Transcript p.97)
11. Low-band VHF frequencies experience "skip" interference from other telecommunications systems. In addition, atmospheric conditions cause the existing low-band radio signals to propagate for hundreds of miles and can interfere or block local transmission. (State Police 1, p.9-5)
12. The current radio system has some poor or no communication areas and cannot be totally compensated for by propagation or antenna techniques available to low-band VHF. (State Police 1, p.9-5)
13. Features such as voice encryption and mobile data terminals (MDT) are not available because of equipment and technology limitations imposed by the low-band VHF. The current radio system cannot support the digital data transmission speeds required for either of these uses. (State Police 1, p.9-5)
14. Problems and design faults with the existing low-band VHF radio system include: a) the 40 year old design is not sized for the traffic demands of an existing 1100 trooper force, b) the physical structures are old and in need of replacement, c) the sites are not fenced or alarmed, d) channel capacity varies from radio to radio and the frequency band in use is not being further developed, e) frequencies are subjected to propagation and noise problems, f) some areas have poor or no communications

("dead spots"), and g) no voice encryption or mobile data terminals (MDT) are available. (State Police 1, pp.9-3 and 9-4)

15. The State Police investigated and rejected five other communications systems for the following reasons:
 - 1) Copper wire landlines could not support the numbers of channels or transmission speed required with the use of a computer driven operation;
 - 2) Satellite terminals were cost prohibitive in usage charges;
 - 3) Fiber optic installation costs for the number of miles necessary were an unaffordable expense and susceptible to damage and extended outages;
 - 4) Leased fiber optic networks did not offer any cost savings or managerial and budgetary control; and
 - 5) An analog microwave network did not provide higher transmission speed, system expansion, or intelligent networking. (State Police 1, p.11-1 and 11-2)

Proposed State Police Radio System

16. The proposed State Police Connecticut Telecommunication System (CTS) would be a digital microwave network for point-to-point communication and an 800 MHz trunked two-way radio system consisting of 49 tower sites throughout the State of Connecticut. (State Police 1, pp.5-3 and 5-4)
17. The Connecticut State Police in conjunction with other public agencies in the Tri-State and New England regions cooperated in developing plans for licenses from the Federal Communications Commission (FCC). Agencies that participated in this planning effort were recognized as qualified 800 MHz users. This frequency is capable of supporting the future needs of the State Police, which cannot be met or made available in other bands. (State Police 1, pp. 2-12 and 2-13)
18. Selection of an 800 MHz trunked radio system was based on the demands and systems available to meet them. Mobile data terminals, voice encryption, support of 2000 units, and the capability of expansion could only be serviced by the latest trunked system employing digital addressing for radio control. The lack of other frequencies to handle the number of channels required a portion of the 800 MHz spectrum to be opened for public safety agencies. (State Police 1, p.11-3)
19. The proposed CTS would handle large volumes of daily radio traffic as well as large numbers of simultaneous messages generated during emergency situations. The proposed CTS would be designed, developed, and implemented to enhance public safety, increase levels of security for sworn personnel, and provide service well into the next century while allowing for technological advancements. (State Police 1, p.10-1)

20. The basic architecture of the CTS network would be microwave radio links between existing troops, district commands, headquarters, and other fixed locations including hilltop radio base stations. Four new sites would be added to provide line-of-site paths for digital microwave, and seven new sites would be added to meet propagation coverage requirements of the 800 MHz trunked two-way radio system. (State Police 1, p.12-1)
21. Remote towers act as interconnection points to help alleviate effects of earth curvature and topographical features. Antenna center lines for line-of-sight microwave paths have been calculated using conservative criteria in estimating tower height and placement. (State Police 1, p.12-1)
22. The digital microwave network would provide known radio control, voice and data circuits (including voice encryption and MDT), higher transmission speed for computer operation, intelligent digital interface permitting system reconfiguration at remote sites, and a building block expansion capacity. (State Police 1, p.11-2)
23. The design objective of the digital microwave radio network would be for an average path reliability of approximately 99.99 percent or 5.3 minutes of outage per year per path. (State Police 1, p.12-3)
24. Tower design loadings include all current antennas (point-to-point and two-way radio), future requirements of other State/local agencies, a hypothetical expansion of three 6-foot diameter microwave dish antennas mounted at the top of the tower, and other private entities that the State Police would allow to share the tower. The tower would be designed in accordance with EIA Standard 222-D to withstand a wind loading of 90 mph wind with 1/2 inch of radial ice. (State Police 1, pp.12-1, 12-2, and 13-E-1; State Police Late File Exhibit 6, #6)
25. Self-supporting lattice towers were selected because of greater structural strength, simpler maintenance, and their capacity for multiple use. (State Police 1, p.12-2; State Police 2, Q.3)
26. The digital microwave network would connect all State Police facilities and would provide radio control, computer connection, and emergency telephone circuits in the event the telephone landline network becomes overloaded or inoperative. (State Police 1, p.2-11)
27. The CTS would provide uninterrupted operation, additional channel capacity, and communication between local, State and federal agencies while eliminating current interference problems. (State Police 1, p.2-11)

28. Completion and on-line operation of a state-wide CTS point-to-point microwave system would be the middle of 1994. (State Police 2, Q.25)

Proposed State Police Telecommunications Tower

29. The proposed facility is part of a State Police plan to upgrade its communication equipment to enhance public safety. Implementation of this plan includes sharing tower space in order to avoid the construction of additional towers within the State. (State Police 1, pp.3-1, 3-2, 5-3, and 10-1)
30. A 180-foot self-supporting, lattice tower is proposed to replace an existing 180-foot monopole on a half-acre lot on Fennwood Lane owned by the Division of the State Police in Wilton, Connecticut. (State Police 1, p.13-D-1; Transcript p.117)
31. The existing 180-foot monopole replaced the original 190-foot guyed tower in 1976 and would be removed once the proposed tower is operational. The original 190-foot guyed tower was constructed in 1940. The existing tower cannot be modified to support additional antenna loadings. (State Police 1, pp.2-7 and 13-G-1; State Police 2, Q.2 and 23; Transcript p.117)
32. The existing 960 MHz radio link that supports a low-band VHF radio system at the Fennwood Lane site would remain in operation until the microwave CTS network is installed. The 960 MHz radio link requires an antenna height of 169 feet to alleviate natural and man-made obstructions. (State Police 1, p.12-1; State Police 2, Qs.2, Attachment 2 sheet 1, and Q.4)
33. There are fourteen existing towers within a 10 mile radius of the proposed site. None of these towers fall within a one mile radius search area of the existing State Police tower necessary to maintain the existing low-band radio coverage. (State Police 1, p.13-R-1; State Police 20, p.9)
34. The State Police considered and rejected six sites in the Wilton area. A site at an existing tower in the Wilton landfill would be disruptive to the present 960 MHz radio system and would require a tower height over 700 feet to establish the proposed CTS point-to-point microwave link to Westport or Greenwich. Potential sites located on Powder Horn Road, Thistle Lane, and Belden Hill Road would all be within residential areas. Sites near the reservoir and Range Road would require towers over 200 feet which would need lighting and painting as aviation hazards. (State Police 14; Transcript pp.118-119 and 148-149)

35. The proposed 800 MHz CTS radio system would provide 20 percent more coverage from the proposed tower than utilizing sites in the Wilton landfill and Troop "G" in Westport. (State Police 15)
36. The proposed site would be a link between the future Trumbull, Greenwich, and Westport tower sites. (State Police 1, section 13-A)
37. The proposed tower would support operations of the State Police, Fairfield County Chief of Police Association, Department of Education, Department of Health Services (DHS), United States Secret Service (Secret Service), and SNET Cellular, Inc. (SNET). (State Police 1, p.2-7, section 14 p.12; State Police 2, Q.2)
38. The Department of Education is implementing an Instructional Television Fixed Service throughout the State. The Wilton transmitter for this service would be placed on the proposed tower to service the lower Fairfield County schools. The proposed site would provide the optimum transmission range for this service. (State Police 17)
39. The DHS would use the proposed tower to expand its administrative/emergency radio communications in Southwestern Connecticut and to tie their communications needs into the State CTS microwave network. (State Police 16)
40. The Secret Service would use the proposed tower to expand its telecommunications network in lower Fairfield County and replace an existing site in Trumbull. The Secret Service would abandon its Trumbull site if it were able to attach to the proposed Wilton tower. (State Police 18)
41. The Fairfield County Chiefs of Police Association would use the proposed tower as a repeater site in its Area Operations Network for interdepartment communications. (State Police 1, p.15-1; State Police 2, Q.2; State Police 3)
42. SNET would use the tower to operate a cellular telephone facility. (State Police 1, pages following 15-2; State Police 2, Q.2)
43. The State Police antennas would consist of a 6-foot monopole mounted at 100 feet, a 6-foot folded monopole mounted at 120-feet, a 6-foot microwave dish mounted at 169 feet, a 5-foot whip antenna mounted at 170 feet, a 6-foot microwave dish mounted at 175 feet, an 8-foot microwave dish mounted at 176 feet, five 1-foot yagi antennas mounted at 179 feet, and a 6-foot folded monopole

and three 13-foot whips on top at 180 feet. The Department of Education would mount a 6-foot microwave dish at 75 feet and a 7-foot whip antenna on the top at 180 feet. DHS would mount an 11-foot dipole array at 112 feet. The Secret Service would mount a 22-foot four dipole array at 85 feet. SNET would mount two 11-foot whip-type omnidirectional transmit antennas at the 139-foot level, and four 11-foot whip-type omnidirectional transmit/receive antennas at the 150-foot level. The Fairfield County Chief of Police Association would mount a 9-foot whip antenna at 170 feet. The overall height of the tower with antennas would be 193 feet above ground level. (State Police 1 section 13-L; State Police 2, Q.2 Attachment 2 Sheet 5 and 6)

44. A proposed 29-foot by 55-foot equipment shelter would be constructed adjacent to the proposed telecommunications tower. Approximately 40 percent of the space would be utilized by SNET, 30 percent of the space would be used by the State Police, 17 percent of the space would be for the generator room, and 13 percent would be reserved for other users. (State Police 2, Q.8 Attachment 5)
45. The proposed four-sided tower would have a leg spread between 18 and 20 feet while a three-sided tower would have a leg spread of 28 to 30 feet. (Transcript p.116)
46. The proposed facility would be located within a residential zone and has been in use as a telecommunications site since 1940. Abutting residences have been developed from 1949 through 1974. (State Police 1, p.13-D-1 and section 14, p.11; State Police 2, Q.23 and 24, Attachment 12)
47. There are approximately 23 residences within a 1,000-foot radius of the proposed telecommunications tower. There are two houses approximately 194 feet from the proposed tower. (State Police 2, Q.12; State Police 19, p.2)
48. Access to the proposed site would be via Fennwood Lane, an existing private driveway off Belden Hill Road. (State Police 1, Section 14)
49. The approximately 1600-foot private right-of-way, Fennwood Lane, would be graded, paved, and improved at the expense of SNET. (State Police 8)
50. The fall zone of the proposed tower would encompass the State of Connecticut's Division of Public Safety property and sections of all abutting properties. The only structure within the fall zone of the tower would be the State Police equipment building. (State Police 2, Q.10, Attachment 6; State Police 10)

51. The Miller-Driscoll school complex serves over 900 students and faculty. Its property line lies approximately 500 feet northwest of the proposed tower base. The nearest school building lies approximately 625 feet from the proposed tower base. (Town of Wilton 1, p.2)
52. The calculated power density at 500 feet from the proposed tower base would be 0.9684 percent of the American National Standards Institute (ANSI) safe limit standard. At 600 feet from the proposed tower base the power density would be 0.6920 percent of the ANSI safe limit standard. (State Police 10, section 13-0)
53. There would be 26 antennas on the proposed tower of which 10 would receive and 16 would transmit. Receive antennas do not emit energy and those that transmit are listed as follows:

ID.	Operating Frequency (MHz)	EIRP (Watts)	ANSI Limit of Safe Exposure (mW/sq cm)	At the base of the tower		
				Power Density ¹ (mW/sq cm)	Percent of Safe Limit ²	Percent Subtotal by ID.
SP	867.500	1641	2.892	0.0162	0.5585	
SP	867.500	1641	2.892	0.0162	0.5585	
SP	6700.000	16305	5.000	0.0292	0.5832	
SP	6700.000	9172	5.000	0.0257	0.5131	
SP	42.040	492	1.000	0.0050	0.5033	
SP	42.040	492	1.000	0.0111	1.1141	
SP	154.665	541	1.000	0.0062	0.6231	
SP	954.400	372	3.181	0.0011	0.0351	4.4889
SC	887.000	1805	2.957	0.0256	0.8644	
SC	887.000	1805	2.957	0.0256	0.8644	
SC	887.000	1805	2.957	0.0256	0.8644	
SC	887.000	1969	2.957	0.0279	0.9429	3.5361
ED	2674.000	124	5.000	0.0013	0.0253	0.0253
HS	153.815	327	1.000	0.0081	0.8120	0.8120
FP	154.100	327	1.000	0.0037	0.3682	0.3682
SS	165.688	653	1.000	0.0243	<u>2.4270</u>	<u>2.4270</u>

Total Percent of Safe Limit = 11.6575 11.6575

Notes:

ID. - Antenna Identification

EIRP - Effective Isotropic Radiation Power

SP - State Police

SC - SNET Cellular Inc.

ED - Department of Education

HS - Department of Health Services

FP - Fairfield County Chief of Police Association

SS - United States Secret Service

1 - assuming all channels operating at maximum power with antenna patterns not considered

2 - Percent of ANSI Safe Limit Standard

(State Police 1, section 13, p.N-1 and section O; State Police 10, section 13-N; Office of Science and Technology Bulletin (OST) No. 65)

54. The current, calculated electromagnetic radio frequency power density at the base of the existing State Police tower, assuming all channels operating simultaneously at maximum allowable power and broadcasting from all antennas with antenna patterns not considered, is a total of 6.7 percent of the ANSI safe limit standard, as adopted by the State of Connecticut under CGS section 22a-162. (State Police 1, section 13 O; Transcript pp. 89-91; Office of Science and Technology Bulletin (OST) No. 65)
55. The calculated electromagnetic radio frequency power density at the base of the proposed telecommunications tower, assuming all channels operating simultaneously at maximum allowable power and broadcasting from all antennas with antenna patterns not considered, would be a total of 11.6575 percent of the ANSI safe limit standards, as adopted by the State of Connecticut under CGS section 22a-162. (State Police 10; OST No. 65)
56. The calculated power density at the base of the proposed facility, assuming all channels operating simultaneously at maximum allowable power and broadcasting from all antennas, and considering the antenna patterns of the proposed equipment, would be in compliance with the following radio frequency standards for frequencies, which would be used by the proposed facility, between approximately 40 and 10,000 MHz:

<u>Organization/State/Country</u>	<u>Approximate Standards Range in mW/sq cm between 40 and 10,000 MHz</u>	
National Council on Radiation Protection	0.3	to 1.0
International Radiation Protection Association	0.3	to 1.0
United States' ANSI (State of Connecticut)	1.0	to 5.0
United Nation's World Health Organization	0.3	to 1.0
State of Massachusetts	0.3	to 1.0
Bulgaria		0.1
Canada	0.04	to 1.0
Holland		10.0
Israel and Sweden		1.0
United Kingdom	0.09	to 0.5
Union of Soviet Socialist Republics	0.004	to 0.01
West Germany	4.0	to 10.0
(State Police 19, sheet 4)		

57. In 1982, ANSI reviewed and revised its safety standard to a lower limit and reported "no verified reports exist of injury or adverse effects on the health of human beings who have been exposed to rfem (radio frequency electromagnetic) fields within the limits of frequency and power density specified by previous ANSI guides." (State Police 20, p.4)

58. The proposed site facility would be supplied by emergency power during power failures by a 45KW propane fueled generator which would be tested once a week for approximately 15 minutes. (Transcript pp. 120)
59. Heating and air conditioning within the equipment building would be powered by electricity. (State Police 1, section 14, p.6)
60. An inland wetland is approximately 650 feet west of the proposed tower. Provisions to control erosion and sedimentation would be implemented during construction of the tower and equipment building within State Police property boundaries and the improvement of Fennwood Lane. (State Police 1, section 14, p.5)
61. There are no known extant populations of federally endangered and threatened species or Connecticut "species of special concern" occurring at the site. (State Police 1, section 14, pp. 9 and 10; DEP letter dated May 9, 1989)
62. On August 10, 1989, the FAA found that the proposed telecommunications tower would not be a hazard to air navigation and obstruction marking or lighting would not be necessary. (State Police 1, section 1; State Police 16)
63. There are five houses within a quarter mile of the proposed site that are of historical significance. One house on 368 Belden Hill Road on the corner of Fennwood Lane is eligible for the National or State Registrar of Historical places. (Town of Wilton 1, p.2; Stephen Farley 1; and Transcript pp.30-32)
64. The Connecticut Historical Commission recognizes significant historic and architectural resources along Belden Hill Road. However, the Commission finds "the proposed facility will not represent a radical visual intrusion upon the existing neighborhood." (State Police 13, Addendum)
65. The cost estimate for construction to be incurred by the Division of State Police is as follows:
- | | |
|----------------------|-----------------------|
| 1. Radio equipment | \$422,600 |
| 2. Antennas | \$64,400 |
| 3. Power systems | \$34,900 |
| 4. Tower and shelter | \$0 |
| 5. Miscellaneous | <u>\$20,000</u> |
| | Total cost \$541,900. |
- (State Police 2, Q.5, Attachment 3)
66. Users of the proposed tower would make preventative maintenance visits ranging from once per week to once per month. (Transcript pp.121-122)

Proposed SNET Cellular Site

67. SNET found the existing State Police tower to be compatible with their site selection criteria and negotiated with the State Police to permit SNET the right to share space on the proposed replacement tower and within the new equipment building. (State Police 1, section 15, SNET)
68. SNET would be responsible for construction costs of the proposed tower, equipment building, and improvements to the access road. (State Police 2, Q.5, Attachment 3 and Q,26)
69. This site would provide additional cellular service along State routes 7, 33, 106, and 123 and in the local areas of Wilton, New Canaan, and Norwalk, Connecticut. (State Police 1, section 15, SNET)
70. SNET's proposed Wilton site would off load existing cellular traffic from sites in Westport, Norwalk, and Stamford. (Transcript pp. 112, 114, and 115)
71. The construction cost to be incurred by SNET is as follows:
- | | |
|-----------------------------|-----------------------|
| 1. Cellular Radio equipment | \$179,515 |
| 2. Tower and Antennas | \$106,000 |
| 3. Power systems | \$170,670 |
| 4. Equipment shelter | \$325,000 |
| 5. Miscellaneous | <u>\$80,000</u> |
| | Total cost \$861,185. |
- (State Police 2, Q.26)

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