

To,

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New Delhi-110016

**Sub: Lok Sabha Parliament Questions Dy. No. 4458**

Sir,

The inputs for the above Lok Sabha Questions are as under:

Lok Sabha Question

Un-starred

D. No. 4458

**Q- (a) Whether the Government has taken any steps to popularize ‘Ham Radio’ in the schools under ‘Vigyan Prasar Yojana’;**

**Ans-** A special programme on ham radio and its uses, benefits and techniques of using is run by Vigyan Prasar, an autonomous organization of the Department of Science & Technology. This has been consistently so from the year 1998. Such programmes have been organized almost across the length and breadth of country. This has been through various outreach programmes especially among school children and students of technical institutes in many parts of the country. This includes nationwide campaign for the promotion of Ham Radio (‘Amateur Radio Service’ as it is officially described under the Indian Wireless Telegraphs Rules of the Ministry of Communications & IT) as an alternative mode of community communication for experiments in radio technology, and for emergency communication during large scale natural disasters. Workshops, training programmes were organized in coordination with other governmental agencies/society/radio clubs/schools especially for technology demonstration and skill development for the target groups and to create a pool of emergency radio communication volunteers.

The Ham Radio Outreach activities of Vigyan Prasar are conducted by Shri Sandeep Baruah, Scientist-E [ a regular staff at Vigyan Prasar who holds a ‘General Grade’ Amateur Wireless Telegraph Station Licence with radio call-sign VU2MUE issued by the WPC wing of the Ministry of Communications & IT]. Vigyan Prasar is utilizing his “Expertise” and “Service” to promote ham radio since 1998. The range of activities includes – technology demonstration and lecture on ham radio; providing resource material, training materials/hands-on guidance to prepare the ham radio licence aspirants to appear for the Amateur Station Operator’s Certificate (ASOC) Licencing examination conducted by the Department of Telecommunications; networking of the hams (licensed radio amateurs) in the country – specially emergency disaster preparedness activities and day to day ham radio utilitycommunications via Amateur Radio Repeater Station VU2DLR established at Vigyan Prasar; imparting training on new generation ham radio digital communication technologies;

Book/Publications including 'Scanning the World with Amateur Radio [1992]; 'A Guide To Ham Radio' [2000, Vigyan Prasar; Digital version available in Vigyan Prasar website URL: <http://vigyanprasar.gov.in/digital-library/free-english-books/> ] is used all over India by ham radio clubs to train students in radio communication technology; 'The World of Radio Communication' [2014, A Hands On Activity Book for Radio Transmitter Kit Building Workshop conducted under EduSAT Summer Science Festival programme. A revised edition is brought out in 2017 to give freely to the students along with a kit to make a FM Toy Transmitter] and Ham Radio Promotion through Internet/Multimedia.

**Ques -b) If so, the details thereof State wise; and**

**Ans-** Outreaching/Training/Demonstration programmes have been conducted in Delhi/NCR; Haryana; Uttarakhand; Himachal Pradesh, Chandigarh, Uttar Pradesh, Rajasthan, Gujarat, Maharashtra, Tamil Nadu, Andhra Pradesh, West Bengal, Sikkim, Assam and Madhya Pradesh. State wise details are self explanatory in the list below: **117 important activities as Ham Radio Promotional Programmes Conducted from the year 2003 onward in different States of India are indicated below**

**Ans-** Outreach / Training / Demonstration programmes have been conducted in Delhi/NCR; Haryana; Uttarakhand; Himachal Pradesh, Chandigarh, Uttar Pradesh, Rajasthan, Gujarat, Maharashtra, Tamil Nadu, Andhra Pradesh, West Bengal, Sikkim, Assam and Madhya Pradesh. State wise details are self-explanatory in the list below covering **117 important activities as Ham Radio Promotional Programmes Conducted from the year 2003 onward in different States of India.**

1. Jamia Hamdard University (Delhi) on August 21, 2003.
2. Punjab State Council for Science & Technology in Chandigarh on October 1, 2003.
3. Vishwa Bharati Public School, Noida on November 21, 2003.
4. Sardar Patel Vidyalaya, Lodhi Estate, New Delhi on December 16, 2003.
5. Bharat Scouts & Guides Camping Ground, Nizamuddin (New Delhi) on October 14, 2003
6. During Vigyan Rail Programme at Lucknow Railway Station from January 9 to 13, 2004.
7. Gyan Bharti Public School (Saket) on September 6, 2004.
8. Indian Institute of Technology, Delhi (IIT Delhi) on September 12, 2004. [also in 1999] Ref: <http://www.vigyanprasar.gov.in/hamold/IITWorkshop.htm>
9. DAV School (Dayand Vihar) on September 30, 2004.
10. Marry Hill School (Gwalior, Madhya Pradesh) On October 6, 2004.
11. Government Senior Secondary School (Mori Gate) on November 4, 2004.
12. Sarvodaya Vidyalaya (ISBT), Delhi on November 5, 2004
13. Sarvodaya Kanya Vidyalaya (Idgah Road) on November 8, 2004.
14. Sarvodaya Kanya Vidyalaya (Jennat Mahal) on November 9, 2004.
15. Jamia Millia Islamia University from February 8 to 11, 2005.
16. At Bhimtal, Uttarakhand on February 18 & 19, 2005 (Workshop on Science & Technology for Development of Uttaranchal jointly with Jan Sikshan Santhan, Bhimtal) Documentation: <http://www.qsl.net/vu2msy/bhimtal/index.html>
17. On June 28, 2005 at Shimla on the occasion of Capacity Building of Resource Persons for Disaster Preparedness at the behest of State Council for Science, Technology and Environment, Shimla.
18. At Bilaspur, Himachal Pradesh on September 16, 2005 on the occasion of a second zone level workshop on 'Capacity Building of Resource Persons for Disaster Preparedness'
19. Viswa Bharati Public School, Noida on November 11, 2005

20. Vishwa Bharati Public School, Noida on February 04, 2006 coinciding with NASA's mass publicized SuiSat-1 ham satellite (spacesuit satellite) launch from International Space Station. Related news  
[http://www.qsl.net/vu2msy/documentation/Times\\_of\\_India\\_Mumbai.jpg](http://www.qsl.net/vu2msy/documentation/Times_of_India_Mumbai.jpg)
21. D.A.V.Public School, Sector 49, Faridabad on April 28, 29 & 30 April,2006 on the occasion of a Science Awareness Mela organised by Science Aur Kainat Society of India.
22. Cambridge School, Sector 27 on July 20, 2006.
23. Bal Bharati Public School, Noida on September 1 (Friday), 2006
24. Vasant Valley School, New Delhi on January 15, 2007
25. Apollo International School, Sonipat on January 24, 2007
26. 26 BITS (Birla Institute of Technology & Science, Pilani, Rajasthan) on March 25, 2007 (Sunday) Video Documentation at: <https://youtu.be/zXT08p80Sj0>
27. Assam Police Radio Organisation (APRO), Guwahati on June 20, 2007. Video documentation: <https://youtu.be/L-XyNgSAPBA>
28. Bal Bharti Public School, Brij Vihar on July 17, 2007
29. Vishwa Bharti Public School, Noida, Sector 29 on July 22, 2007
30. Bharat Scouts and Guides Camping ground located at New Ashoka Nagar on October 31, 2007
31. Demonstration of Ham Radio during Rail Utsav 2007 organized jointly by Vigyan Prasar and National Rail Museum, New Delhi Video Documentation: <https://youtu.be/AL3yAeTa2rM>
32. Blue Bell Public School, Gurgaon, Sector 10 on November 16, 2007 Video Documentation: <https://youtu.be/fWGFex6levE>
33. Uttam Public School Girls, Shastri Nagar, Ghaziabad on November 19, 2007
34. Indian Institute of Technology, Kanpur (IIT Kanpur) from February 15 to 17, 2008 on the occasion of TECHKRITI 08 - annual technical festival of IIT Kanpur. IIT KanpurNews:[http://www.southgatearc.org/news/february2008/techkriti\\_2008\\_report.htm](http://www.southgatearc.org/news/february2008/techkriti_2008_report.htm) Video Documentation: <https://youtu.be/yKuIeCQcujo>
35. Jangal Mangal, Dehradun on March 1, 2008 on the occasion of the first State Science and Technology Youth Festival-2008 Ref: <http://www.riverdevil.org/Dehradun/>
36. Haryana Institute of Public Administration, Gurgaon on April 8, 2008 at Haryana Institute of Public Administration, Gurgaon on the occasion of a 5 days workshop which was attended by Class I & II Government officials from different departments. Video Documentation: <https://youtu.be/gT9nA65qGCK>
37. Participation in an International Exhibition on Disaster Management (Disaster Management 2008) at Pragati Maidan, New Delhi from April 16 to 18, 2008 organised under the auspices of National Disaster Management Authority.
38. May 2 [ SATURDAY ], 2009 Jaipur, Rajasthan A lecture and demonstration programme on ham radio was organized by Vigyan Prasar at Poornima College of Engineering, Jaipur, Rajasthan on May 2 [SATURDAY], 2009. It is one of the successful ham radio awareness programmes ever organized by VP, where more than 1000 students participated at a single time.
39. May 14 [ THURSDAY ], 2009 Gurgaon, Haryana A lecture and demonstration programme on ham radio was organized at Haryana Institute of Public Administration [HIPA], Sector -18, Gurgaon, Haryana on May 14, 2009 which was attended by 40 Class-I officials [Doctors, Engineers, Police Officials] from different districts of Haryana participating in a training programme on 'Flood Management'.
40. May 30, [SATURDAY], 2009 Dehradun, Uttarakhand A lecture and demonstration programme on integrating ham radio APRS [Automatic Position Reporting System ® - Trademark of Bob Bruninga, WB4APR, US Naval Academy ham club allowed to be used by hams for free ] technology to the EMRI-108 UK [Emergency Management Research Institute, Dehradun] for real time text messaging and ambulance tracking of the 90 ambulances/rescue vans operated by EMRI and Govt. of Uttarakhand was held jointly with UCOST, DST, Uttarakhand and EMRI on May 30 [SATURDAY], 2009 at UCOST guesthouse conference hall.

41. Guidance was offered to students at Gurukul school, Pune, Maharashtra to prepare projects and presentation of use of ham radio for disaster management under the CBSE Social Science Curriculum.
42. Guidance offered to engineering students in Chennai for IAF tambram base for their Aeroplan tracking project. They could finally submit a project for a AIR FORCE Flying School [IAF tambram base]. <http://www.xanthusaero.co.cc/>  
Undersigned got an email acknowledgement that their project was successful.
43. September 9, 2009: Toy Transmitter Kit building Ham Radio and Electronics workshop in Hindi conducted through EduSAT Multicast Studio.
44. September 16: Toy Transmitter Kit building Ham Radio and Electronics workshop in English conducted through EduSAT Multicast Studio.
45. October 11 (SUNDAY) 2009: Awareness Programme on Ham radio for the residents and children of Kaushambi, Ghaziabad A ham radio awareness (lecture and demonstration) programme was organized at Kaushambi on October 11 (SUNDAY), Ghaziabad at the behest of Kaushambi Apartments Residents Welfare Association. A letter of appreciation from KARWA and related news items attached herewith for submission to DST. KARWA would soon start a training programme from the Children and Senior Residents under their Disaster Mitigation Plan.
46. October 14, 2009: Toy Transmitter Kit (Ham Radio and Electronics) building workshop in English conducted through EduSAT Multicast.
47. November 21 (SATURDAY), 2009: Awareness Programme (Lecture/Demonstration) on Ham radio at Mount Abu Public School, Rohini, New Delhi-85
48. December 16, 2009: Lecture and demonstration on Role of Ham Radio in Disaster Management at National Institute of Disaster Management (NIDM, Ministry of Home Affairs) Training Session on Role of Ham Radio in Disaster Management at National Institute of Disaster Management (NIDM, Ministry of Home Affairs) which a part of the training module of the Training Programme on Basics of Disaster Management for Civil Defence Officers. 14 Civil Defence officials from different states of India participated in the programme.
49. February 3, 2010: Introduction to Ham Radio through EduSAT Multicast Studio.
50. Radio Active 2010 Ham Radio Events at IIT Kanpur [February 11 to February 14, 2010 ] IIT Kanpur has an active ham radio club instrumental in motivating the future technocrats to the world of ham radio. The ham radio club station VU2IIT is equipped with state-of-the-art Satellite Ready Transceivers and half a dozen handheld VHF transceivers including dozens of VHF Yagi antennas made by the students. The 'Radio Active' event was coordinated by Mohsin Hasan Khan – a student of Department of Aerospace Engineering. Shri Sandeep Baruah, VU2MUE [Scientist, Vigyan Prasar]- a mentor of IIT Kanpur ham radio club attended as a guest lecturer deliberating lectures and demonstrations on different ham radio digital communication technologies [Packet Radio, Automatic Packet Reporting System (APRS), Citizens Weather Observation Programme (CWOP) involving weather data sensors integrated to ham radio equipment for packet telemetry transmission etc.]. Multifaceted applications of ham radio were demonstrated by Shri Baruah including demonstration of ham radio text messaging and computer to computer communication using radios hooked to the computers for file uploading and downloading without the use of Internet. It was emphasized in his lecture about the possibility of exploring the voluntary services of ham radio hobbyists across the Country in transmitting and exchanging of close-proximity weather information through a digital repeater [digipeater] network. At present there are only about 300 weather stations maintained by IMD. According to an estimate, India needs around 20,000 automatic weather stations for collating and analyzing the weather information by the meteorologists and agriculturists for better accuracy in the prediction models.

Hams can contribute in dissemination of these data if an effective Digital ham radio network can be established, which will benefit the farmers.

- 51.** National Seminar on Disaster Management “SAFE World 2010” Disaster Management Technology at Bengaluru [March 18 to 19, 2010] Shri Sandeep Baruah, Senior Scientist Vigyan Prasar attended the National Seminar on Disaster Management as a delegate on invitation from Mrs. Jija Madhavan Harisingh, IPS, Director General of Police, Civil Defence, Commandant General, Home Guards, Director General, Fire and Emergency Services. Demonstrated advanced ham radio search and rescue technologies to the Volunteer Civil Defence Wardens, who are also ham radio operators.
- 52.** April 22-24, 2010: Training Programme at CDM, LBSNAA, Mussoorie for IAS probationers Shri Sandeep Baruah, Senior Scientist from Vigyan Prasar conducted training sessions on digital ham radio communication technologies from April 22 to April 24, 2010 as a "Guest Lecturer for the IAS Probationers at Centre for Disaster Management (CDM), Lalbahadur Shashtri National Academy of Administration (LBSNAA), Mussoorie. IAS Probationers were trained on interfacing of ham radio equipment to computers for multifaceted digital modes of radio communication [Like integration of Weather Station for real time transmission of weather data using a network of ham radio digital repeaters and at the same time integration of ham radio to Internet through IGATEs [Internet Radio Gateways, Echolink VoIP Radio Linking for remote access to Internet using hand-held radios, Packet Radio Bulletin Board System for Science Club activities etc.]
- 53.** Low-cost ham radio kit building workshop at Indian Institute of Technology Kanpur [IIT Kanpur] ham radio club VU2IIT A low cost ham radio kit building workshop was organized at Indian Institute of Technology Kanpur [IIT Kanpur] from August 14 to 15, 2010 along with demonstration and lecture on ham radio digital communication technologies for the members of IIT Kanpur ham radio club station VU2IIT. Prof. A.R. Harish, VU2HAR was also present during the programme.
- 54.** Programme at Snow & Avalanche Study Estt. [Research & Development Center], Ministry of Defence, DRDO, Chandigarh [September 16,2010 ] A technology demonstration programme was organized at Snow & Avalanche Study Estt. (Research & Development Center), Ministry of Defence, DRDO, Chandigarh on September 16, 2010, where the integration of weather station to ham radio transceivers for real-time telemetry transmission of weather parameters via a network of high altitude digipeaters (ham radio digital repeaters) was demonstrated by Shri Sandeep Baruah, VU2MUE - Senior Scientist from Vigyan Prasar and a technical session was conducted for the DRDO scientists involved in high altitude Snow & Avalanche Study. Dy Director Amrik Singh briefing the DRDO technical staff on utility of ham radio for automatic collection and monitoring of weather through ham radio telemetry system
- 55.** Programme at New Star Academy School, Pitampura A ham radio awareness programme was organized for CBSE teachers from different schools at New Star Academy School, Pitampura on September 25, 2010 . CBSE teacher from Abhinav Public School, Pitampura having on-the-air Interaction with hams in Delhi.
- 56.** Programme at 1 Haryana R&V NCC Sqn, Hisar Training Sessions on ham radio and GPS Technology was organized at Hisar, Haryana Agricultural University from October 07 to 08, 2010 for the NCC cadets attending Annual Training Camp at 1 Haryana R&V NCC Sqn, Hisar.
- 57.** Amateur Radio (ham radio) community in India is represented by Vigyna Prasar at NFAP-2010 (National Frequency Allocation Planning) Meeting held at Ministry of Communications & IT on 29 November, 2010 For the time first time in the history of ham radio in India, Amateur Radio (ham radio) community in India is represented by Vigyan Prasar at NFAP-2010 (National Frequency Allocation Plan) Meeting held at Ministry of Communications

& IT on 29 November, 2010. Vigyan Prasar proposals appeared at WPC website at the following links:

<http://www.wpc.dot.gov.in/nfaprevision.asp>

Vigyan Prasar proposals to NFAP-2010, WPC meeting in PDF format at :

<http://tinyurl.com/39mzrb9>

All the proposals are related to different radio privileges sought by ham radio community in India and concerning issues which may hamper the growth of ham radio in India

- 58.** Vigyan Prasar Ham Radio Repeater Station VU2DLR Reactivated Vigyan Prasar maintains VHF ham repeater station VU2DLR licensed by WPC from its C-24 office. The old repeater after 11 years of round the clock operation developed multiple problems. Delhi's VHF Amateur [ham] Repeater Station VU2DLR is again made operational on 10.02.2011. VU2DLR Repeater Station first went on-the-air on December 9, 1998 and since then serving the ham radio community round the clock until the old equipment developed multiple problems. The present Repeater System is made up of two YAESU/Vertex Standard [Japan] VX-2200 Radios [so-called 'back-to-back'], a 'Repeater Controller Interface' and an WACOM[USA] 4 Cavity Duplexer to the existing Diamond[Japan] antenna on a 45 feet tower making the whole repeater system. Antenna height approx. 100 feet from ground...the same old location approved by SACFA, WPC. Hams are satisfied with the performance of present VU2DLR repeater system. Networking of hams in-and-around Delhi is successful through this system. The Repeater would support hams to remain radio-active and VP's ham radio promotional programmes would get a boost. The repeater would also facilitate second line of utility communication in the event of any large scale disaster when the other modes of communication may fail
- 59.** During the Training Programme on Basics of Disaster Management for Civil Defence Officers [ from 9-13 May ] organized by National Institute of Disaster Management [ NIDM, Ministry of Home Affairs, GOI ], Sessions on " Role of ham radio in Disaster Management" were conducted on May 11, 2011.
- 60.** A lecture and Demonstration programme on 'Ham radio as Alternative Communication System" was conducted at Haryana Institute of Public Administration [ HIPA, Gurgaon ] on the occasion of a training programme sponsored by Department of Personnel & Training [DOPT], Govt. of India on May 26, 2011.
- 61.** A Lecture and Demonstration programme on ham radio was conducted at DAV Public School, Dayanand Vihar, East Delhi on July 8, 2011 where approximately 50 students participated.
- 62.** DAV Public School, Dayanand Vihar, East Delhi is deputed as an Emergency Relief Centre in case of any disaster/eventuality by DDMA [ East ]. Vigyan Prasar guided and trained the students of the school to build and display working models of emergency communication system for the exhibition Need for Disaster Preparedness which was held on September 2 and 3, 2011. A workshop was organized at Vigyan Prasar C-24 office on July 25, 2011 where about 50 students participated. Students were trained in assembling low-cost radio transmitters and 'study materials' were provided to prepare for the amateur radio operators licencing examination.
- 63.** Vigyan Prasar has been organizing meeting of hams for technical discussions, presentations, display of homemade equipment, new innovations etc. for the last several years. Vigyan Prasar also runs a VHF Repeater Station VU2DLR from C-24 Building round-the-clock facilitating two-way radio communication. Coinciding with the visit of President of Amateur Radio Society of India, Chennai, a meeting of the hams in the NCR region was organized on July 31, 2011. 35 hams from Delhi and nearby areas participated in the meeting which was chaired by the, Director of Amity University, who himself is a ham.
- 64.** Vigyan Prasar's expertise in ham radio digital communication was sought by Mission for Geo-Spatial Applications, Department of Science and Technology, Vishwakarma Bhawan. VP coordinated with the MGA team during a demonstration of

the Software Defined Tactical Radio to the Hon'ble Minister of Science & Technology on August 9, 2011.

- 65.** On the occasion of the inauguration of the Emergency Relief Centre [sponsored by DDMA (East)] at DAV Public School, Dayanand Vihar, East Delhi, a radio communication booth was established by the students on September 2 and 3, 2011. Vigyan Prasar provided all the logistical support to the school as a mentor in making the event a success.
- 66.** A lecture and training session on ham radio was conducted through Vigyan Prasar's EduSAT Satellite Interactive Terminal Studio for the remote classroom SITs on September 20, 2011.
- 67.** Students of the Electronics and Telecommunication department of BITS Pilani is taking up a 'Near Space Weather Balloon Project. As Vigyan Prasar has the expertise in ham radio digital communication technologies for real-time tracking and weather telemetry transmission, support and guidance were provided to the BITS Pilani students. The technology guidance page prepared for them by Shri Baruah is at: <http://www.riverdevil.org/Opentracker.html>
- 68.** Under the students ham radio experiments programme, NASA is encouraging building of ham radio nano-satellites [10 cm x 10 cm] by the University students. As more and more ham radio nano/micro ham satellites are being under construction at different universities of the world to carry out different scientific experiments, Vigyan Prasar's expertise is sought by technical institutes in establishing satellite ground stations for receiving and tracking of the Low Earth Orbit [LEO] ham satellites. Necessary guidance was provided to Satellite Ground-Station Team, Atharva College Of Engineering, University of Mumbai. They have now successfully installed the system which was acknowledged by AMSAT-North America. Atharva Satellite Ground-Station was inaugurated at The Atharva College of Engineering, University of Mumbai in India on March 15, 2012. The student team at Atharva College of Engineering are associated with the Indian Institute of Technology, Bombay for the communication, telemetry and data acquisition of their Pratham student satellite project. During the formal inauguration on March 15, 2012 Students at Atharva Satellite Ground-Station successfully communicated to Delhi using the Indian ham satellite VO-52 covering a distance of 850 Miles from Mumbai. Atharva College of Engineering, University of Mumbai established a Ham Radio Satellite Ground Station under the guidance of Shri Sandeep Baruah, VU2MUE - Senior Scientist from Vigyan Prasar Yojana.
- 69.** State Level Ham Radio Orientation Programme at Dehradun With an aim to establish a high altitude ham radio repeater station at 10,000 feet altitude in Uttarakhand to facilitate a dedicated ham radio network [ with ham radio club stations in schools and colleges ] in 13 districts of Uttarakhand, an orientation workshop for 50 ham radio licensees/licence aspirants trained by Vigyan Prasar was conducted jointly with U-COST [Uttarakhand State Council for Science and Technology] at Doon University on October 26 and 27, 2012. Participants were taken on a field trip for practical demonstration of ham radio communication techniques. UCOST Director in principle agreed to establish a VHF ham repeater station which would facilitate ham radio communication not only in Uttarakhand but also the neighbouring states owing to the high altitude location [proposed location Surkanda Devi Temple Complex which would give a 360 degrees coverage of Line of Sight VHF signals ]
- 70.** Ham Radio Training Session at NIDM-National Institute of Disaster Management Ham radio training sessions were conducted at NIDM on October 31, 2012 at NIDM for the Civil Defence Officers participating in a Training Programme on Basics of Disaster Management.
- 71.** Sandeep Baruah, VU2MUE- Senior Scientist from Vigyan Prasar coordinated an International Space Station [ISS] School contact programme at Gujarat Science City as an expert on ham radio satellite communication during the NASA ARISS [Amateur Radio on International Space Station ] school contact programme organized by Gujarat Council of Science, Ahmedabad on November 14, 2012 at Gujarat Science City. Students successfully talked to ham radio operator Sunita

Williams, KD5PLB onboard ISS. Students talked to Sunita Williams through ham radio telepatch system.

72. To commemorate the 100th Indian Science Congress held at University of Kolkata, a Special Event ham radio station call-sign was issued by the Ministry of Communications for ham radio operation from Kolkata from January 3 to January 7, 2013. A Special Event ham radio station [Special call-sign granted by WPC was AT0I Alpha Tango Zero India] was operated from January 3 to January 7, 2013 from Kolkata to commemorate 100th Indian Science Congress. This was create awareness about the event on-the-air.
73. Ham Radio Workshop for VIPNET Science Club Members of Bal Bharati Public School, Noida. A one day workshop on new ham radio digital communication technology was organized for 45 students of Bal Bharati Public School, Noida on 18<sup>th</sup> Janaury,2013.  
<http://www.southgatearc.org/> is a ham radio portal run by dedicated ham radio promoters in UK. They embedded a portion of the video documentation of this workshop in their website at:  
[http://www.southgatearc.org/news/january2013/students\\_using\\_ham\\_radio\\_for\\_the\\_first\\_time.htm#.USyLDqJkP4g](http://www.southgatearc.org/news/january2013/students_using_ham_radio_for_the_first_time.htm#.USyLDqJkP4g)
74. A Workshop on Ham Radio Digital Communication was organized at Vignan Techno SPAES School, Vignan Techno Nagar, Huzurnagar, Nalgonda District, Andhra Pradesh on 27th April, 2013. National Institute of Amateur Radio (NIAR) also assisted Vigyan Prasar in organizing the programme.
75. During the Uttarakhand disaster in June 2013, undersigned activated the Vigyan Prasar ham radio station for emergency communication to assist the ham radio stations operating from disaster affected areas. This was featured in the NDTV India (Hindi). The Video clip of the news is available at:  
<http://youtu.be/1ObdwqohRnk> PTI quoted Vigyan Prasar at various newspapers about the role hams in emergency communication. One of the news links:  
<http://ibnlive.in.com/news/uttarakhand-floods-ham-radio-gives-ray-of-hope-to-families-of-missing/402904-3-243.html>
76. Student coordnator for ham radio Shri Pranjal Jain from Vellore Institute of Technology, Vellore from B. Tech in Electronics and Communication Engineering did internship at Vigyan Prasar. He passed the Amateur Radio Licencing examination conducted by Ministry of Communications and received his licence. He was guided to assemble a low-cost ham radio transceiver. He is now taking initiative to establish a ham radio club station at VIT Vellore to promote ham radio.
77. Vigyan Prasar guided Amateur Radio Club Gwalior VU2GWL for an Astronaut to Student School Contact Programme. ARISS (Amateur Radio on the International Space Station) is an international program that supports educational outreach as well as provides an opportunity for informal contacts between astronauts/cosmonauts and amateur radio operators as well school children around the world. The Tele-bridge ham radio contact programme with Gwalior Glory High School was successfully Conducted on August 31, 2013 where undersigned was invited as an expert [News link: Ref: [http://articles.timesofindia.indiatimes.com/2013-09-03/bhopal/41725932\\_1\\_iss-astronauts-telebridge-outer-space](http://articles.timesofindia.indiatimes.com/2013-09-03/bhopal/41725932_1_iss-astronauts-telebridge-outer-space).  
Italian astronaut ham Luca Parmitano, KF5KDP talked to the children from space answering various questions. This is the first astronaut school contact programme in India which was approved by NASA on the basis of a request from a school. All the past astronaut to school contact programme in India were prioritized by NASA on the basis of request from astronaut hams on board ISS.
78. Ham Radio prompter Sandeep Baruah, VU2MUE who is the Resource Person Scientist [present Rank 'E'] at Vigyan Prasar was invited to the National Conference of the Ham Radio Operator's in India HAMFEST India 2013 (Held on Sept 21-22 September 2013) at Gwalior as a guest to conduct a technical session on ham radio digital communication technology. He deliberated a technical presentation with demonstration on multifaceted applications of ham radio digital

communication emphasizing the need to expand the scope of ham radio. Nearly 400 hams from India and adjoining countries participated. HAMFEST India at Gwalior in 2013 also brought out a searchable CD of the database of hams in India jointly with Vigyan Prasar (Cost of replication borne by the HAMFEST India 2013 organizers) for distribution in the kit bag. The CD uses a compilation of the database of ham radio operators by Vigyan Prasar. This is the only searchable database of ham radio operators in India presently available online, where PIN code wise, City/Town/village wise, State wise search of hams is possible which would come in handy to locate hams in emergencies for disaster communication related work.

- 79.** A ham radio workshop was organized on September 27, 2013 at Girijananda Institute of Management and Technology- a premiere technical institute in Guwahati. 70 students participated the programme.
- 80.** On the occasion the the EduSAT National Workshop at Goa held from October 28 to 31, 2013, a technical session on ham radio was conducted. Many SITs now showing interest in organizing ham radio training programmes.
- 81.** A Research Paper on the theme "Web-based and location based Geospatial Services for Disaster Management": A Practical Radio and Internet Based Approach for Disaster Risk Reduction and Management through Geospatial Information Studies using Automatic Packet Reporting System (APRS) accepted by the International Workshop of ISPRS; full presentation made on November 21-22, 2013 at Hyderabad organized by Indian National Centre for Ocean Information Services, Ministry of Earth Sciences, Govt. of India.
- 82.** Technical support in International Ham Radio Project Vigyan Prasar's ham radio station participated in an United Kingdom High Altitude Society [UKHAS] near space atmospheric study balloon experiment project. Assisted the United Kingdom High Altitude Society [UKHAS] in tracking their high altitude near space balloon during its flight from UK to India via Atlantic ocean and Africa. Leo Bodner, M0XER -a ham radio experimenter from England acknowledged us for helping him tracking his high altitude balloon M0XER-5 flying all the way from UK to India [Ref: <http://www.leobodnar.com/balloons/B-45/index.html> ]. The balloon for atmospheric study was launched on 11th April 2014 at 15:20 UTC and tracked and reported its position on 19 April 2014 11:19 UTC over New Delhi, India. So far 66 pico balloons were launched by UKHAS, UK: <http://www.leobodnar.com/balloons/>. It uses National Oceanic and Atmospheric Administration [NOAA]'s HYSPLIT [Hybrid Single-Particle Lagrangian Integrated Trajectory”(HYSPLIT) Model] forecast [http://www.arl.noaa.gov/HYSPLIT\\_info.php](http://www.arl.noaa.gov/HYSPLIT_info.php)  
Ref to Vigyan Prasar’s tracking and reporting to the experiment: [http://www.leobodnar.com/balloons/B-45/M0XER-5-received-at-New-Delhi-India\\_1.jpg](http://www.leobodnar.com/balloons/B-45/M0XER-5-received-at-New-Delhi-India_1.jpg)  
[http://www.leobodnar.com/balloons/B-45/M0XER-5-received-at-New-Delhi-India\\_2.jpg](http://www.leobodnar.com/balloons/B-45/M0XER-5-received-at-New-Delhi-India_2.jpg)
- 83.** A Ham Radio workshop for 50 students of BAL BHARATI PUBLIC SCHOOL, BRIJ VIHAR was conducted on 7th May, 2014 at Vigyan Prasar.
- 84.** On the occasion of the EduSAT Summer Science Festival, an activity based guidebook [entitled The World of Radio communication] on ham radio is brought out to be used to conduct do-it-yourself radio technology workshops for the participating Satellite Interactive Terminals [SITS] networked under VP's EduSAT Multicast Programme.
- 85.** Deliberated a presentation with practical demonstration of ham radio technologies at NIDM [National Institute of Disaster Management, New Delhi] for 32 Disaster Managers [NCC officials] from different states of India on 4th Sept, 2014. The demonstration included APRS(r)[Registered trademark of Bob Bruninga, WB4APR, US Naval Academy] and SSTV ham radio image transmission too. A smart phone was used to demonstrate how ham radio SSTV images can be received through ham radio on a smart phone when cell phone networks may not work.

Participants were also introduced to Morse Code technology as an alternative to digital modes of communication and its importance was explained.

- 86.** Ham Radio at graVITas 2014 - An International Knowledge Carnival at Vellore Institute of Technology University, Vellore [VIT University, Vellore] A ham radio technology programme was organized at VIT University, Vellore on 27<sup>th</sup> September, 2014 for the students of Electronics & Communications Engineering Department of Vellore Institute of Technology University, Vellore on the occasion of their Technical Festival graVITas 2014. Vigyan Prasar official Shri Sandeep Baruah attended and organized the programme as a Guest Speaker invited under the "Uncommon Indians" category]. APRS -A US Naval Academy ham radio technology was demonstrated to the students. It was demonstrated how a map on a laptop can be changed by pressing a radio button remotely which cannot be done by a smartphone. Morse Code technology was also demonstrated as an alternative to digital modes of communication. Social Media reference:

<https://www.facebook.com/media/set/?set=a.10202898428116810.1073741880.1085772931&type=1&l=14204a88ef> VIT University Vellore News:

[http://www.southgatearc.org/news/2014/september/ham\\_radio\\_at\\_gravitas\\_2014.htm#.Vby5WvlhQZw](http://www.southgatearc.org/news/2014/september/ham_radio_at_gravitas_2014.htm#.Vby5WvlhQZw)

- 87.** Media Outreach

1. As per Vigyan Prasar's mandate to reach out to the media to promote its science promotional activities including ham radio technology, demonstrations were organized for a few media channels [namely NDTV and Indian Express]. NDTV gave an extensive coverage on VP's ham radio promotional activities which is reported on NDTV's July 22, 2014 technology portal Ref:

<http://gadgets.ndtv.com/telecom/features/the-first-social-network-chewing-the-rag-with-indias-ham-radio-operators-562745>

2. Indian Express National daily featured another report mentioning Vigyan Prasar's role in ham radio promotion in its July 10, 2014 edition. Epaper

Ref: <http://epaper.indianexpress.com/c/3129768> Alternative link:

<http://indianexpress.com/article/lifestyle/no-friend-requests-no-signing-up-a-social-networking-club-powered-by-radio-waves/>

- 88.** As a part of preparing multimedia instructional videos on ham radio technologies, videos uploaded to YOUTUBE are well appreciated by ham radio promoting portals. University of Southampton, England [which is a research intensive university] acknowledged VP's participation in their WebSDR Project [Web Software Defined Radio Project] through their ham radio web Portal. They run a dedicated radio which can be tuned remotely by unlimited multiple users using a web browser from anywhere in the world. VP's reference at:[http://www.southgatearc.org/news/2014/september/suws\\_ham\\_radio\\_websdr\\_used\\_from\\_india.htm#.VAaitvmSya9](http://www.southgatearc.org/news/2014/september/suws_ham_radio_websdr_used_from_india.htm#.VAaitvmSya9)

Tutorial Videos on ham radio by Vigyan Prasar are well accepted by the

International ham community. Tutorial videos uploaded by him is well appreciated

<https://youtu.be/gFXMbrldgng> [20,202 views] SDRsharp/SDR software needs initial frequency calibration while using with R2838U or R2832U with R820T Tuner USB SDR dongle. This is done from the configuration settings by correcting the receiving frequency offset. Usually by increasing the frequency in ppm [parts per million]. If Transmission freq. of a station is 145.825 MHz, 1 ppm [1 part per million] would be equivalent to

145.825 Hz.

$145.825z = 145825000 \text{ Hz}$

$\text{ppm} = 145825000/1000000 = 145.825 \text{ Hz}$

$100 \text{ ppm} = 14582.5 \text{ Hz i.e. } 14.5825 \text{ kHz}$

$73 \text{ ppm} = 145.825 \times 73 = 10645.225 \text{ Hz} =$

i.e. 10.645225 kHz

So arbitrarily if we assume that the dongle is 100 ppm offset; this implies an offset of 14582.5 Hz, i.e. 14.5825 kHz. NFM [Narrow Band FM] transmission has a bandwidth of 10 kHz. If the dongle is a few kHz off [say more than 10 kHz] the receiving frequency in SDRsharp, it would not zero beat on the frequency of the transmitter [received by the dongle] for the TX to be audible on SDRSharp. So the SDRsharp needs calibration. The ppm correction value in SDRsharp software usually vary from 50 to 70 for most of the R2832/2838 [with R820T Tuner] . In my case it is approx. 73 ppm, i.e. the dongle has an offset of  $145.825 \times 73 = 10645.225$  Hz, i.e. approx. 10.645 kHz which is compensated in SDRsharp by frequency correction/ppm correction.

**89.** A Keynote Speech was deliberated by Sandeep Baruah, Scientist-E at Birla Industrial and Technological Museum [BITM Kolkata], Kolkata during a seminar on the occasion of "World Amateur Radio (Ham Radio) Day" on 17th April, 2015. The seminar was attended by 150 participants from different schools, 25 hams and representative of Scouts and Guides from 30 schools. 150 copies of the study material on ham radio brought out by Vigyan Prasar were distributed to the participants.

**90.** A Record Ham Radio Outreaching Effort at National and International Level during Nepal Earthquake Post Recovery Emergency Operation: Preceded and catalyzed by the post disaster Nepal Earthquake Ham Radio Emergency Communication Operation during the recovery process spanning nearly two months (April and May, 2015), a record 2907 number of people were reached out nationally and internationally through the social media [Facebook and YOUTUBE] within a span of few weeks in creating awareness about the importance of the use of ham radio as a second line of communication. Sandeep Baruah, Scientist-E (a ham radio licensee himself for last 26 years) assisted the Emergency Ham Radio Network in relaying, monitoring and coordinating with stations operating from different parts of the world along with International Amateur Radio Union Regional coordinator. Some of the ham radio emergency operations are video documented by him in YOUTUBE at the following YOUTUBE Links:

1. [https://youtu.be/67Vc6\\_6\\_i0g](https://youtu.be/67Vc6_6_i0g)
2. <https://youtu.be/jVGwO73d7Uk>
3. <https://youtu.be/hu-Vmcbbx4>
4. <https://youtu.be/7BF4kNicY8o>

There are thousands of views from different places of the world creating awareness internationally on the importance of ham radio as a second line of communication.

**91.** Use of ham radio during the Nepal Earthquake Post Recovery Emergency Operation also caught mainstream media attention. Bangalore Times quoted Sandeep Baruah, Scientist-E of Vigyan Prasar in their 27th April, 2015 issue while the earthquake recovery process was on. The news was posted in Social Media by him at the following "Public Link":

<https://www.facebook.com/photo.php?fbid=10204214323653376&set=t.1085772931&type=3&theater>

This Facebook post fetched a record 159 number of sharing by FACEBOOK users from across the world (most of the users who are not in his friend list) and 460 people from different parts of the world liked the news [at the time when this report was prepared earlier]. This is a record outreaching effort in creating awareness about the importance of ham radio Nationally and Internationally with the thousands of people being reached out through social media is [Facebook and

YOUTUBE combined]: Approx 5000. The Bangalore Times article can be accessed at:  
[http://www.qsl.net/vu2msy/disaster\\_communication/Bangalore%20Times%20Ham%20Radio%20News%2027%20April.pdf](http://www.qsl.net/vu2msy/disaster_communication/Bangalore%20Times%20Ham%20Radio%20News%2027%20April.pdf)

- 92.** During a 5 day training programme on Community Based Disaster Risk Reduction (ToT Course) at National Institute of Disaster Management NIDM from 5th May to 8th May, 2015, Lecture and Demonstration programme on the Role of Ham Radio in Disaster Risk Reduction was conducted. The target participants were senior officers of various departments at Central/State/District levels including Administrative, Planning & Development, Border Road Organization, PWD, Forest Department, Civil Defence, State S&T Council etc.
- 93.** A Field demonstration of ham radio was organized for Vasudha Vigyan Club, which is a unit of Children Welfare Wing under Vasundhara Integrated Residents Welfare Association (VIRWA), Vasundhara, Ghaziabad on 24th May, 2015.
- 94.** Presentation of Research Paper on ham radio at International Seminar on Disaster Risk Reduction organized by TIFAC, DST: A "Research Paper" Entitled "Radio Based Approach for Disaster Risk Reduction and Management Using Automatic Packet Reporting System and Ham Radio (Amateur Radio) Digital Communication Technologies" authored by Sandeep Baruah, Scientist-E was accepted by a panel of International Experts of IDRiM (International Society for Integrated Disaster Risk Management) and the abstract published in their compendium <http://idrimjournal.com/> during the 6<sup>th</sup> International Annual Conference of the IDRiM\_TIFAC <http://www.idrim2015.org/> which was sponsored by Ministry of Science & Technology, Govt. of India, ISRO, United Nations, Ministry of External Affairs, Oxfam and organized by TIFAC (Technology Information, Forecasting and Assessment Council, Department of Science and Technology, Govt. of India <http://www.tifac.org.in/>) The paper was presented along with technical demonstration during 6th International Conference of the International Society for Integrated Disaster Risk Management IDRiM, held on 28-30 October, 2015 at Scope Convention Centre, Lodhi Road, New Delhi. The participants in the session on ham radio included 5 Japanese delegates including IDRiM Panelist Hirokazu Tatano, DPRI, Kyoto University Japan. Approximately 300 delegates from India and abroad [Brazil, Russia, India, China (BRIC), Germany, Austria, Iran etc. ] attended the conference.
- 95.** Citation of Ham Radio Promoter in India, Vigyan Prasar Scientist Sandeep Baruah's Research Work in International Research Paper: The Research Work done by Sandeep Baruah, Scientist-E of Vigyan Prasar in the field of ham radio digital communication was cited in an international paper [http://www.researchgate.net/publication/268100793\\_A\\_Low\\_Energy\\_APRS-IS\\_Client-Server\\_Infrastructure\\_Implementation\\_using\\_Raspberry\\_Pi](http://www.researchgate.net/publication/268100793_A_Low_Energy_APRS-IS_Client-Server_Infrastructure_Implementation_using_Raspberry_Pi) by the students of Faculty of Electrical Engineering, University of Sarajevo and Faculty of Engineering and Information Technologies, International Burch University Sarajevo, Bosnia and Herzegovina in their Research Paper "A Low Energy APRS-IS Client-Server Infrastructure Implementation using Raspberry Pi". The "Rationale" of their project is said to be from his research work cited in Page No. 2 of the paper for the 22nd Telecommunications Forum (TELFOR) Conference at Belgrade, Serbia.
- 96.** During the Hamfest 2015-A National Technical Event of the licensed ham radio operators on December 4, 2015, held at Rajkot, Gujarat, a technical workshop on Digital Communication was conducted by Sandeep Baruah, Scientist-E for approximately 400 ham radio operators from India
- 97.** April 1 to 4, 2016 Ham Radio Workshop conducted at National Institute Technology NIT Hamirpur, Himachal Pradesh as a Guest Speaker. Nearly 100 students participated in this workshop and presently preparing for their Amateur Station Operator's Certificate Exam conducted by the Ministry of Communications & IT. Study Materials were provided to the

students. Video of Pre-Demo Drill conducted at the premises of NIT Hamirpur, Himachal Pradesh with my radio and antennas installed Ref: <https://www.facebook.com/sandeep.baruah/posts/10206229486311183>

- 98.** April 12, 2016 Lecture and Demonstration of Ham Radio at Russian Embassy Cultural Centre as a guest lecturer/invitee on the occasion of Yuri Gagarin [who was a ham] Day. Demonstration of Digital communication was given and there was a video show in which the following video was played to make the participant's aware about NASA's ham radio satellite ARISSat-1 programme which was named KEDAR [Ham radio call-sign of Late Yuri Gagarin ] to commemorate the space flight of Yuri Gagarin. In this video it was demonstrated how amateur radio experimenters receive images transmitted from space. The video link: <https://youtu.be/HTbnHZWDHUI> From lecture the participants realised the importance of Amateur Radio in space communication
- 99.** May 8 to 16 A State Level Ham Radio Training Programme was conducted by Vigyan Prasar for the tribal resource persons at Gangtok, Sikkim for 50 participants from 4 districts of Sikkim conducted at Sikkim State S&T Council [Sikkim Science Centre]. Media coverage:  
[a] <http://www.qsl.net/vu2msy/documentation/01HamRadioForSikkimConcludesNewsSikkimExpress15May2016.jpg>  
[b] <http://www.qsl.net/vu2msy/documentation/02HamRadioTrainingSikkimExpressNews10May2016.jpg>  
[c] <http://www.qsl.net/vu2msy/documentation/03HamRadioNewsSikkimTraining2016forFB.jpg>
- 100.** June 21, 2016 Lecture and Demonstration Programme at National Bal Bhawan as a Guest Speaker.
- 101.** July 22, 2016 Lecture and Demonstration Programme at NSIT [ Netaji Subhash Institute of Technology, New Delhi ] as a Guest Speaker. The pictorial report with details at <http://www.qsl.net/vu2msy/HamRadioDigitalFusionTechnologyDemonstrationatNetajiSubhasInstituteofTechnology.html>
- 102.** August 5 to 7, 2016 Lecture and demonstration programme at Royal Global School, Guwahati as a Guest Speaker. Pictorial report at : <http://www.qsl.net/vu2msy/IntroducingHamRadioatRoyalGlobalSchoolGuwahati.html>
- 103.** September 14 to 15 Attending ABES Engineering College as an invited National Expert on ham radio along with International Expert Dr. Miroslav Skoric from University of Nuvisad, Serbia for deliberating presentation on ham radio digital communication and practical demonstration during the ACM India Compute ABES Chapter International Workshop on "Amateur Radio Communications & Computing in Educational Environment". The International workshop was sponsored by Department of Information Technology, govt. of India. Important Highlights of Major Programmes: Approximately 20,000 people [Ham radio enthusiasts] from around the world including India were reached out by Vigyan Prasar in the last few year through different mediums of outreaching, contributing to the cause of Ham Radio Promotion in India and abroad. Web Ref: [http://gn.dronacharya.info/Amateur\\_Radio\\_jan\\_2016.asp#ad-image-0](http://gn.dronacharya.info/Amateur_Radio_jan_2016.asp#ad-image-0)

Expertise of Shri Sandeep Baruah is commended at IEEE magazine at: <http://gcn.comsoc.org/amateur-radio-lectures-poland-and-india>
- 104.** Major and Unique National Facilities created: India's first ham radio Digital Repeater System is installed at Vigyan Prasar on 27 January 2016 which would facilitate utilization of the new general Digital Mobile Radio (DMR-TDMA) technology in Amateur Radio Service for utility and emergency communication.

- 105.** Demonstration of Ham Radio Digital Communication at the National Festival of the Ham Radio Operators: On 6th of November, 2016 a Technical Session was conducted by Shri Sandeep Baruah, Scientist-E at the 25th National Conference of the ham radio operators held at Mount Abu, Rajasthan which was live streamed on Internet in YOUTUBE channel at the following link: <https://youtu.be/7VacLQeFNRM> Shri Baruah received a hearty felicitation from the organizers for his 25 years of voluntary committed and dedicated service promoting ham radio in India. He was felicitated by the Chairman of the Conference Dr. D. R. Kaarthiskeyan, IPS. 400 hams from India and abroad attended the programme.
- 106.** **A lecture and demonstration programme on ham radio was organized at Guwahati on December 24 and 25, 2016** at the behest of Amateur Radio Society of Assam (ARSA) where students from Goalpara College, local radio enthusiasts and officials from NDRF (National Disaster Response Force) were apprised of the new ham radio digital technologies useful for emergency communication. The newly licensed amateur radio radio (ham radio) operators Ashok Brahma, VU3YPB (Working President of Amateur Radio Society of Assam), Bhagaban Barman, VU3XBP (Secretary of ARSA, Ritu Mahanta, VU3ZRI and Pranab Kr. Choudhury, VU3YPK would be promoting the amateur radio ham radio activity in Assam jointly with Vigyan Prasar and Assam Police Radio Organization (APRO). The amateur radio club station VU2VKP located at the HQ of APRO is presently operational with Mr. Taher Ahmed, VU2TUO, an official in the Assam Police Radio Organization as the custodian of the club. Several demonstration programme were earlier organized by Vigyan Prasar at APRO in the past. In this video, Dr. P.M. Dastidar, Inspector General (IG) of Police, Assam Police Radio Organization (Now Retired who is a former professor of physics at Cotton College, Guwahati) is introduced to ham radio digital modes <https://youtu.be/rqDcPe8p8ME>
- In this video <https://youtu.be/L-XyNgSAPBA> Mr. Taher Ahmed, VU2TUO [ This year he is awarded the President's Police Medal by CM of Assam ] an official at Assam Police Radio Organization (APRO) was introduced to ham radio Automatic Packet Reporting System (APRS) which is a digital mode useful for emergency communication/tactical operation during national emergency.
- 107.** Participation at National Programme on "Communications in Emergencies and Disaster Situations organized by National Institute of Disaster Management (NIDM) jointly with Directorate General of Doordarshan  
Shri Sandeep Baruah, Scientist-E from Vigyan Prasar attended as an expert at the National Programme on "Communications in Emergencies and Disaster Situations organized by National Institute of Disaster Management (NIDM), Ministry of Home Affairs in collaboration with Directorate General of Doordarshan on January 18, 2017. Shri Baruah practically demonstrated different ham radio technologies relevant to emergency communication for which a temporary ham radio cross-band repeater system was installed at NIDM as a relay station to demonstrate accessing of Delhi Ham Radio Repeater Station VU2DLR located at Vigyan Prasar and local VHF Line-of-Sight communication was established with another ham radio station at Gurgaon operated by retired General Manager of Powergrid Shri Atanu Dasgupta, VU2ATN, who addressed the participants as a part of the demo. Ankur Puranik, VU2AXN, the Chief Commanding Officer (Engineering & Wireless) of Disaster Amateur Radio Emergency Services (DARES), Mumbai Civil Defence at NIDM live streamed a portion of Shri Baruah's presentation/demonstration which can be viewed at: <http://tinyurl.com/hvydvqw>
- 108.** Shri Sandeep Baruah, Scientist-E from Vigyan Prasar was invited as a "Guest of Honour" to the East India Ham Conference 2017 held at Kolkata, Mandarmoni Beach, West Bengal on 28 January, 2017 -organized jointly by Amateur Radio Convention and Conference Samity (ARCCS) Kolkata and by Society Of Radio Amateurs (SORA), Patna -- two ham radio promoting societies. A technical session was conducted by Shri Baruah where 100 hams from different states from East India participated.

### **Ham Radio Outreaching activities carried out in 2017-2018**

- 109.** In continuation to the ham radio workshop conducted at NIT Hamirpur, Himachal Pradesh last year to prepare the students to appear for the amateur radio licencing examination at International Monitoring Station, Ghitorni, New Delhi, a hands-on workshop was again conducted on 7th and 8th April, 2017 at NIT Hamirpur. Students were practically demonstrated ham radio antenna installation procedures [ Social Media reference of the "Video Documentation" available at public link: <https://www.facebook.com/hashtag/vu2muenithamirpur?source=embed> ]. During this workshop Shri Sandeep Baruah, Scientist-E, Vigyan Prasar was also accompanied and assisted by Shri Atanu Dasgupta, VU2ATN - Retired General Manager (Telecom, Powergrid) who as an accomplished ham with vast technical experience. Students assembled a very low power 7 MHz ham radio transceiver during the workshop. A "Ham Radio Society" was formed by the NIT Hamirpur students under our guidance. Web Ref: <https://hamnith.wordpress.com/>
- 110.** A Session on Ham Radio was conducted by Shri Sandeep Baruah, Scientist-E at Haryana Institute of Public Administration as Guest Faculty on 9th May, 2017 where 50 Civil Defence Officials were introduced to ham radio and preliminary training provided.
- 111. An activity book on "Radio Communication" for hands-on kit building workshop was brought out by Vigyan Prasar authored by Shri Sandeep Baruah, Scientist-E, Vigyan Prasar**
- 112.** During the EduSAT Summer Science Festival, **a radio transmitter kit building workshop was conducted at Vigyan Prasar from June 14 to June 21, 2017**, where students were trained hands-on to assemble a toy radio transmitter. Students were provided with the electronic component and other resources along with the guidebook on radio communication.
- 113.** On 10th July, 2017, Army officials of the 21 Signal Group visited Vigyan Prasar's ham radio facility deputed by Major Abhishek Dwivedi for his officials to be acquainted with amateur radio communication system and the possibility of incorporating ham radio in the Armed forces as a second line of communication was discussed.
- 114.** A Ham Radio Kit Building Workshop and Ham Radio Demonstration Programme was organized at Apeejay School Saket on 10<sup>th</sup> August, 2017.
- 115.** Papers in refereed journals
1. Students of the Department of Electrical Engineering, University of Sarajevo and Faculty of Engineering and Information Technologies, International Burch University Sarajevo, Bosnia and Herzegovina cited the research work of ham radio promoter in Vigyan Prasar in their project paper:  
[http://www.researchgate.net/publication/268100793\\_A\\_Low\\_Energy\\_APRS-IS\\_Client-Server\\_Infrastructure\\_Implementation\\_using\\_Raspberry\\_Pi](http://www.researchgate.net/publication/268100793_A_Low_Energy_APRS-IS_Client-Server_Infrastructure_Implementation_using_Raspberry_Pi)
  2. NSA, CIA, USA Research Paper cited his work at:  
<https://www.nsa.gov/research/tnw/tnw201/article8.shtml>
- 116.** A Full Research Paper Written by Sandeep Baruah, VU2MUE - a ham radio promoter working as Scientist-E in Vigyan Prasar is printed in the final Compendium of **IDRiM\_TIFAC International Seminar** <http://www.idrim2015.org/>  
A copy of the paper is available at:  
[http://www.academia.edu/27256984/A\\_PRACTICAL\\_RADIO\\_AND\\_INTERNET\\_BASED\\_APPROACH\\_FOR\\_DISASTER\\_RISK\\_REDUCTION\\_AND\\_MANAGEMENT\\_THROUGH\\_GEO\\_SPATIAL\\_INFORMATION\\_STUDIES\\_USING\\_AUTOMATIC\\_PACKET\\_REPORTING\\_SYSTEM\\_APRS](http://www.academia.edu/27256984/A_PRACTICAL_RADIO_AND_INTERNET_BASED_APPROACH_FOR_DISASTER_RISK_REDUCTION_AND_MANAGEMENT_THROUGH_GEO_SPATIAL_INFORMATION_STUDIES_USING_AUTOMATIC_PACKET_REPORTING_SYSTEM_APRS)
- 117.** Most recently on 6th of November a Technical Session was conducted by Shri Sandeep Baruah, VU2MUE from Vigyan Prasar at the **25th National Conference of the ham radio operators**

**held at Mount Abu, which was live streamed in high resolution by across the world on Internet** in YOUTUBE channel at the following link: <https://youtu.be/7VacLQeFNRM>  
Shri Baruah received a hearty felicitation from the organizers for his 25 years of voluntary committed and dedicated service promoting ham radio in India. He was felicitated by the Chairman of the Conference.

Some of the Premier institutes where ham radio programmes were conducted are presented in the following:

- IIT Kanpur, Uttar Pradesh
- BITS Pilani, Rajasthan
- IIT Roorkee, Uttarakhand
- IIT Guwahati, Assam
- Atharva College of Engineering Mumbai, Maharashtra
- Vellore Institute of Technology University, Tamilnadu
- Girijananda Institute of Management and Technology, Assam
- Snow & Avalanche Research Institute, DRDO, Chandigarh
- National Institute of Disaster Management (NIDM), NCR
- Army Technology Centre which is a Defense R&D Institute, Delhi Cantt
- Emergency Management Research Institute, Dehradun, Uttarakhand
- Centre for Disaster Management (CDM), Lal Bahadur Shastri National Academy of Administration (LBSNAA) Mussoorie., Uttarakhand
- Haryana Institute of Public Administration, Haryana
- Sikkim Science Centre, Sikkim.

## **CONCLUSION**

Vigyan Prasar believes that the ham radio promotional efforts with demonstration of new technologies is creating an increased interest and enthusiasm amongst the younger generation. This is especially of students from different engineering colleges for data acquisition remotely from experimental ham radio satellites, computer to computer data/ text communication using ham radio equipment interfaced with computers. Some of the Premier institutes where ham radio programmes were conducted are presented in the following:

- IIT Kanpur, Uttar Pradesh
- BITS Pilani, Rajasthan
- IIT Roorkee, Uttarakhand
- IIT Guwahati, Assam
- Atharva College of Engineering Mumbai, Maharashtra
- Vellore Institute of Technology University, Tamilnadu
- Girijananda Institute of Management and Technology, Assam
- Snow & Avalanche Research Institute, DRDO, Chandigarh
- National Institute of Disaster Management (NIDM), NCR
- Army Technology Centre which is a Defense R&D Institute, Delhi Cantt
- Emergency Management Research Institute, Dehradun, Uttarakhand
- Centre for Disaster Management (CDM), Lal Bahadur Shastri National Academy of Administration (LBSNAA) Mussoorie., Uttarakhand
- Haryana Institute of Public Administration, Haryana
- Sikkim Science Centre, Sikkim.

**Ques- C) The manner in which Ham Radio can be promoted in Maharashtra State?**

**Ans-** Ham Radio in Maharashtra also can be promoted in the same manner as explained above.

1. Establish Ham Radio Clubs in all the schools for hands on orientation as a response to the call in. CBSE Textbook TOGETHER TOWARDS A SAFER INDIA PART-III A STRIDE AHEAD for Class X under the newly introduced syllabus on Disaster Management
2. Establish Ham Radio Repeater/Digital Repeater Stations and HF Stations with HF emailing PACTOR system in all the District HQ
3. Train Ham Radio Licence holders as Resource Persons to conduct training in schools throughout India to prepare the students for Amateur Station Operator's Licensing Exam.
4. Produce/replicate of low-cost ham radio transceivers to be provided to school students so that they can immediately come on-the-air after getting the license and learn to tinker with low-cost kits which help them in gaining expertise in electronics and communication.
5. Special focus on fragile coastal and mountain areas and especially for communities in far flung areas will also be useful.
6. Central Government has special scheme to promote ham radio in the school. Under the MPLAD [ Member of Parliament Local Area Development ] Programme Scheme, an MP can allocate Rs. 1 lac fund to establish ham radio club in a school.
7. There needs to be more funding allocation for ham radio infrastructure build-up by Vigyan Prasar across the different state ( e.g. in collaboration with State S&T Councils, Science Centres, Schools, Colleges etc.)

Yours Sincerely,

**(R. GOPICHANDRAN)**  
Director, Vigyan Prasar

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