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THIRD UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE

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Draft report of Committee II

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Addendum

Note by the Secretariat

1. The present addendum contains changes proposed by Committee II of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) to the text of the draft report of the Conference (see A/CONF.184/3 and Corr.1 and 2).

2. The relevant paragraphs of document A/CONF.184/3/Corr.2 are reproduced here with subsequent changes proposed by Committee II, if any, also indicated. The symbol of that document appears in parentheses at the end of the paragraph concerned. Changes to paragraphs that appeared in document A/CONF.184/3 are also shown; paragraphs from that document for which no changes have been proposed are not reproduced here.

3. Text added to the draft report is shown in boldface; deleted text is scored through. An ellipsis [...] indicates that the remaining text of the paragraph is unchanged.

141. To reach its full potential for operational applications in terrestrial, environmental and disaster monitoring, satellite remote sensing must ensure the high revisiting rate needed for applications in support of sustainable development. That could be achieved through coordination of orbital parameters ~~between satellite operators~~ in order to ensure a high revisit capability. Such coordination is encouraged to the extent possible and could be facilitated through CEOS, in collaboration with the Office ~~of~~ **for** Outer Space Affairs, relevant non-governmental organizations and the industry.

142. **Through the United Nations Programme on Space Applications, the Office for Outer Space Affairs should** ~~to~~ increase the awareness of policy and decision makers, scientists and the general public concerned with the protection of the environment **and** ~~it would be useful to~~ establish a comprehensive list of distributors of ~~raw and processed~~ data from Earth observation satellites, as well as **of** analysed information, **including models used, and make same available to Member States.**

142 *bis*. The work of the FAO in using geographic information systems to analyse Earth observation and other environmental data with a view to assisting policy and decision makers should be communicated more effectively to developing countries.

144. An appropriate mechanism should be developed for synergistic cooperation and coordination between the Committee on the Peaceful Uses of Outer Space, with its secretariat, the Office for Outer Space Affairs, and other international bodies working in the space field, including the Commission on Sustainable Development, the United Nations Environment Programme (UNEP), the Global Environment Facility, FAO, the United Nations Educational, Scientific and Cultural Organization (UNESCO), WMO and WHO, in particular on critical issues such as global warming, climate change, human health problems and sustainable development, and with CEOS on the coordination of satellite missions. (A/CONF.184/3/Corr.2)

144 *bis*. There should be a wider and more effective communication of the lessons learned on the use of Earth observation for sustainable development in developing countries, including India's Integrated Mission for Sustainable Development and technical cooperation among developing countries (TCDC) activities such as the cooperation between Brazil and China aimed at the launching of their own Earth observation satellite, the China-Brazil Earth Resources Satellite (CBERS).

145. The economic growth rate of the developing regions will be significantly accelerated by affordable telecommunication services. Satellite communications systems ~~reduce the need for~~ **complement and could replace** terrestrial infrastructure and **have technical and/or economical advantages over terrestrial infrastructure in terms of being able to provide telecommunications services** in rural **and remote** areas. ~~shorten the time required to establish basic and advanced communications in rural areas.~~ Broadband satellite services are ideally positioned to allow those regions to leap directly into modern infrastructures. Satellite communications could also be the key technology to bring developing countries to participate in the process of building up the global information infrastructure (GII) (see para. 236). (A/CONF.184/3/Corr.2)

146. In the past decade, satellite communications and broadcasting have changed significantly in terms of capacity service offerings, lower space segment **(satellites, launchers and control stations), a ground segment (end-user terminals and networks)** and ground equipment costs. [...]

147. Optical fibre technology has vastly increased the capacity and cost-effectiveness of land lines, especially for high-capacity and interactive use. However, satellite systems still have

certain advantages over fibre-optic systems, including: (a) mobility—mobile users cannot be connected to the fibre network directly; (b) flexibility—a terrestrial infrastructure is extremely expensive to restructure; ~~and~~ (c) cost-effective solutions for rural and remote connections—it is not cost-effective to deploy high-capacity fibre networks in areas with low-density traffic and difficult topography; **and (d) wide area services—terrestrial communication system can be reached only within the limited area (at one time) directly.** Thus, satellites and wireless technologies will be important in the future implementation of GII.

149. Satellite **communication** systems are uniquely suited to strengthening the development and extension of distance education. Through such advanced ~~broadband~~ applications as the Internet and two-way interactive video conferencing, local ~~elementary and high~~ **primary and secondary** schools, universities, libraries, corporations, work sites and multi-purpose information centres ~~can~~ **could access data and other information** ~~select courses~~ from a wide range of subjects to ~~create~~ **enrich** ~~or supplement~~ their **programmes**. ~~own curricula.~~

149 *bis*. There is a need to promote the sharing of best practices and experiences in tele-education among countries (a) by organizing well-structured regional and international seminars and (b) by promoting and supporting the documentation of experiments and projects and ensuring the dissemination of reports on those experiments. There is also a need to promote research and studies on the planning, configuration and use of tele-education systems that utilize new and emerging information and communications technologies. The focus of such systems should be on female education, literacy and universalization of elementary education.

150 *bis*. There is growing awareness for the need to study the feasibility of tele-education and tele-health systems for training relevant professionals by providing universal access to means of information retrieval such as the Internet.

151. Communications for rural areas constitute a **particularly essential** ~~key~~ element in development efforts. [...]

152. Satellite communications are also vital in disseminating timely information [...] Nevertheless, in spite of relatively low costs, in many instances the setting-up of space communications segments for rural communities will still be commercially unattractive. ~~In such cases, there is a need for the intervention of government agencies to establish rural communication services, because the societal benefits to be derived far exceed the direct cost of providing the services.~~

156. Apart from enhancing the way in which business is conducted, the satellite communications sector is in itself of utmost significance to the world economy. The world market for satellite communications is distributed between a space segment ~~(satellites, launchers and control stations), a ground segment (end-user terminals and networks)~~ and services. [...]

157. Over the next decade, as a result of the convergence of telecommunications, informatics and audio-visual media technologies, the telecommunications sector will undergo fundamental change. New markets will emerge and market demand will increase owing to the opening of markets to free competition and the globalization of telecommunications equipment, network and services markets and the **increasing role of the private sector in telecommunications,** ~~privatization of traditionally state-owned telecommunications operators,~~ in conjunction with the widest application of the relevant 1997 agreements of the World Trade Organization. [...]

(b) Issues and concerns

158. Radiocommunication systems are the fastest-growing sector of the telecommunications industry. Other radio-based services such as paging, subscriber radio and television delivered

by satellite and global positioning systems are also enjoying rapid growth in many world markets. With increasingly sophisticated systems for navigation, air and maritime safety, new laptop-computer-based mobile data systems, proposed services such as GMPCS and dozens of other new applications still being developed, the allocation of ~~radio~~ frequencies in the ~~electromagnetic~~ **radio** spectrum has become a pressing issue. The issue led to a fundamental review of the planning and coordination framework of the International Telecommunication Union (ITU), which resulted in the adoption of important decisions at the World Radiocommunication Conference in 1997.

~~(b) Issues and concerns~~

159. The revolution in information technology, combined with that in communications, has led to a tremendous increase in capacities for information collection, storage, processing, retrieval and distribution. While that has had a great many positive effects, it can also widen the gap between those who use the technology and those who do not in terms of the amount and timeliness of the information to which they have access. ~~Fortunately,~~ **Although** there is evidence that the same technological tools can be used **to** actually ~~to~~ narrow the information gap, steps need to be taken to address the issue of ~~the information~~ **that** gap between countries.

160. One vital necessity, if the information gap is to be reduced, is universal access to communications and information sources. That involves ensuring access to broadcast signals and to telephony. Technology can now provide television signal and telephone connectivity to any person on Earth, practically irrespective of ~~his or her~~ **the** location. [...]

161. Access to ~~a~~ low-cost **telecommunication services** ~~bandwidth~~ will be a factor as essential to economic development in the twenty-first century as cheap power was to the industrial revolution in the twentieth century. [...]

162. The work **carried out by ITU in allocating and coordinating** ~~of allocation and coordination of~~ the frequency bands for the various space radio communication services **by satellites on** ~~and the associated~~ geostationary and non-geostationary ~~satellite orbital positions~~ **orbits** ~~by ITU~~ needs to be fully supported. ~~and its effects~~ **ITU efforts towards** ~~on~~ developing ~~a more~~ **an** efficient and **more** equitable distribution of **frequency** spectrum-orbit resources need to be encouraged. Taking into account ~~possible~~ technological innovations, **more equitable** ~~in order to ensure~~ access to and use of such resources by developing countries **should be ensured. There is also a need** ~~In this process, the need~~ to protect ~~certain~~ **the** limited frequency ~~domains~~ **bands allocated** for scientific **and research and development purposes**. ~~satellite communications and for radio astronomy must be borne in mind.~~ (A/CONF.184/3/Corr.2)

163. Radio **broadcasting** is the most ubiquitous **means of** communication~~s device~~ in the world. There are over 2 billion radio sets in existence and over 100 million sets are sold every year. A leading company in the space industry is attempting to bring low-cost but high-quality digital radio broadcasting to 3.5 billion people, relying on a digital audio broadcasting system that works by routing a radio signal through a very small aperture terminal **(VSAT)** up to a geostationary satellite. [...]

164. The new global digital radio broadcasting infrastructure being created will enable broadcasters and advertisers to reach under-served, emerging markets ~~Africa, Asia, Latin America and the Caribbean and the Middle East~~ **in the world**. With a new type of radio needed to receive programmes from satellites, people ~~in those areas~~ **throughout the world** will be able to receive digital ~~sound~~ **audio** broadcasting of unprecedented quality and diversity.

165 *bis*. With regard to tele-medicine, there is a need for WHO, ITU and the United Nations, through their appropriate working groups, to define and promote a flexible technical and legal infrastructure, adaptable to health services in different economic and cultural environments.

166. The following specific actions should be taken:

[...]

(d) Study of the feasibility of international and regional cooperative systems for satellite-based broadcasting and communications for development, taking into account the needs of developing countries; (A/CONF.184/3/Corr.2)

(e) Promotion of the development of rural infrastructure for communications through international cooperation**;** (A/CONF.184/3/Corr.2)

(f) Urging government agencies to take appropriate steps to establish communication services for the benefit of rural communities.

167. Global satellite navigation systems ~~(GSNS)~~ **(GNSS)** are space-based radio positioning systems that provide 24-hour three-dimensional position, velocity and time information, in any weather conditions, to suitably equipped users anywhere on the surface of Earth, as well as airborne and space users. Global satellite navigation systems use satellites as reference points to calculate positions accurate to within metres or, with advanced techniques, to within a centimetre. The COSPAS-SARSAT system **(see para. 100)** makes it possible to determine the position of a mobile object fitted with a tracking beacon when the object is in a distress situation ~~(see para. 100)~~. Intended mainly for the study and protection of the environment, the Argos system, developed by the Centre national d'études spatiales of France and placed on board the NOAA-series of meteorological polar-orbiting satellites of the United States, makes it possible to determine the position of a mobile object anywhere on the surface of the Earth (see para. 100). (A/CONF.184/3/Corr.2)

168. There are currently two global satellite navigation systems, the United States' GPS and the Russian Federation's GLONASS (see para. 35). Since their inception, the use of some of ~~their~~ **the** signals from those two existing military satellite navigation systems has been offered free of charge to civilian users. [...]

169. GPS receivers have been miniaturized and their costs drastically reduced, making the technology **more** accessible ~~to virtually everyone~~. GPS technology has matured [...]

170. While satellite navigation and positioning services are most widely known for applications in the field of transportation, the future of global navigation systems ~~is to a large extent~~ **appears** ~~unlimited~~ **promising**, as new applications will continue to be created as a result of technological evolution. The social and economic benefits of the navigation ~~signal~~ **systems** are enormous. Precise timing, location and navigation are integral parts of an evolving global information infrastructure. The signals provided by ~~GSNS~~ **GNSS** enable continuing improvements in the productivity of national and regional infrastructures, such as transportation, telecommunications, oil and gas, agriculture and financial networks, in developed and developing countries. Research on new applications of ~~GSNS~~ **GNSS** technology shows promise in such areas as earthquake monitoring grids, which may become a valuable tool in earthquake prediction, and satellite atmospheric measurements using ~~GSNS~~ **GNSS** signal occultation techniques, which may one day be an important input to weather prediction.

171. To improve the positioning information of the current GPS, the United States has embarked on a GPS improvement programme that will add another signal to each GPS

satellite and will enable easier civilian access to one of the existing military signals. Currently, civilian users of GPS who need accuracy greater than that provided by the single-frequency Standard Positioning Service (SPS) use dual-frequency semi-codeless receivers as well as differential techniques involving GPS and radio transmissions from a known reference base station. However, as the GPS enhancement programme progresses, users will have free use of three signals with similar code structures. With a total of three signals available for civilian use in the future, GPS services will provide more accuracy by allowing easier corrections for atmospheric distortion, greater robustness by protecting against the effects of narrow-band interference, and easier use by allowing more rapid receiver acquisition of signals from the available satellites. Similar activities are now under way with respect to the GLONASS system. (A/CONF.184/3/Corr.2)

172. In addition, the United States, Japan and Europe will install augmentation systems that will provide integrity information as well **as** correction factors that will aid single-frequency users. The United States Wide Area Augmentation Systems (WAAS), **the European Geostationary Navigation Overlay Service System (EGNOS)** and other augmentation systems will use geostationary satellites to broadcast augmentation information over their respective regions, will be designed to be compatible **and interoperable** with each other and will represent a big step towards providing a seamless global augmentation capability. [...]

173. A United States Coast Guard GPS augmentation system for increasing the safety and efficiency of shipping in United States ports and inland waterways is also now being expanded around North America. **Systems for similar purposes are being set up** ~~and duplicated~~ around the world. For urban areas and mountainous terrain—where GPS signals may be difficult to receive—industry is developing new GPS pseudosatellites, or "pseudolites", that can provide additional signals on the ground to ensure that GPS service is always available. [...]

174. To improve the positioning information of the current GPS and GLONASS civil signals, the European Commission, ESA and the European Organization for the Safety of Air Navigation (Eurocontrol) have together begun to implement an initial global satellite positioning system~~, referred to as the European Geostationary Navigation Overlay System (~~ EGNOS~~)~~. EGNOS is based on a regional augmentation of GPS and GLONASS and will employ navigation payloads on geostationary satellites. Europe has initiated the development of the Galileo project, which is a second-generation independent satellite navigation system. (A/CONF.184/3/Corr.2)

175. ~~The European system~~ **Galileo**, ~~which is~~ a civilian system developed through the initiative of the European Union and ESA, is intended for use in many disciplines, from agriculture to transportation, and will meet civil aviation navigation requirements for all phases of flight, from en route to precision approach and landing—the strictest of all satellite navigation user requirements. Benefits of more accurate positioning information for civil aviation include a reduction in the number of accidents, better navigation in all weather conditions and better traffic management. Acceptance of global satellite navigation systems as a basic navigation aid by civil aviation, however, will be influenced by the guaranteed and reliable open access to enhanced positioning information. Currently, most civilian GPS users do not have access to the more precise positioning signal available to military and authorized civilian users, although the GPS civil signal is available to all users free of charge. (A/CONF.184/3/Corr.2)

176. With the availability of high-resolution images from satellites [...] Establishing user-friendly, precise transformation and linkages between the images, ~~GSNS~~ **GNSS** observations and their input into GIS databases will be a critical need in the coming years.

177. A major technical issue associated with the use of ~~GSNS~~ **GNSS** is the fact that cross-correlation between the data that ~~GSNS~~ **GNSS** employs to national data would require the establishment of a geodetic network based on ~~GSNS~~ **GNSS** observations. [...] A key to lowering the cost of implementing these databases is adoption of common world standards for GIS that enable quick and easy translation of ~~GSNS~~ **GNSS** observations into national map databases. Private industry is working to develop common geospatial standards through open, voluntary groups such as the OpenGIS Consortium ~~(http://www.opengis.org)~~.

179. A number of questions also need to be addressed before a new type of satellite navigation system can be deployed on a global or regional basis. ~~It is most desirable that all interested countries cooperate in order to benefit from the development and implementation of such a system.~~ (A/CONF.184/3/Corr.2)

(c) Specific action plans

180. The radio frequency **bandwidth** in which all ~~GSNS~~ **GNSS** operate should be kept free of interference from other radio emissions that could degrade performance of ~~GSNS~~ **GNSS** user equipment. There are issues before ITU that will be acted upon at the World Radiocommunications Conference in May 2000 that could have significant impact on the utility of ~~GSNS~~ **GNSS** to all countries in the future. It is essential that the radio frequency bandwidth used by ~~GSNS~~ **GNSS** be kept free of interference for all earth, air and space users. (A/CONF.184/3/Corr.2)

~~(c) Specific action plans~~

181. A large degree of regional and global cooperation is essential to achieving a seamless multi-modal satellite-based radio navigation and positioning system throughout the world. In that context European entities have started coordination contacts with several countries and organizations, with two objectives**: f**irstly, to examine the possible extension of the EGNOS coverage to other countries or, alternatively, to ensure its compatibility with other regional augmentation systems**; and s**econdly, to study forms of cooperation in view of the **development and** implementation of ~~a~~ second generation system**s**.

182. Further international coordination and consultation is necessary to ensure [...] Countries interested in using ~~GSNS~~ **GNSS** should indicate their support for keeping it free of spectrum interference or reallocation by commercial interests. [...]

183. **To ensure global civil safety,** countries operating ~~the~~ ~~GSNS~~ **GNSS** should commit themselves to not **intentionally** switching off the navigational signals in use or ~~intentionally~~ reducing the quality of those signals. (A/CONF.184/3/Corr.2)

~~183 *bis*. A global positioning civil signal should be continuously supplied to all users (especially developing countries) free of charge.~~ (A/CONF.184/3/Corr.2)

183 *bis*. In defining the terms of access to global satellite navigation signals, due consideration should be given to the provision of a continuous basic service to global civil users on a free-of-charge basis.