Modern Arms Control Challenges
Nuclear Reductions and Missile Defence

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Arms control – a set of measures aimed at cessation of arms buildup, their limitation, reduction and elimination as well as measures aimed at arms nonproliferation.

Arms control - the process of cooperation between states on the issues of restriction, reduction, nonproliferation, production of weapons, deployment and/or use of military forces.

Disarmament – efforts aimed at the increasing stability of international relations with decreasing the number of military forces and weapons by effective and verifiable agreements and confidence-building measures.
Nuclear arms control – a set of measures adopted on the basis of international treaties and oriented at cessation of buildup, limitation, reduction and elimination of nuclear armaments as well as prevention of proliferation of nuclear technologies and nuclear arms, strengthening of trust in nuclear sphere
1972 Strategic Arms Limitation Treaty (SALT I)

➢ At that time the USA had advantage in a number of warheads due to the possession of ICBMs and SLBMs with multiple independently targetable reentry vehicle (MIRV)

➢ Signed simultaneously with Anti-Ballistic Missile Treaty in Moscow on May 26, 1972 for five year period

➢ Came into force on October 10, 1972
1972 Strategic Arms Limitation Treaty (SALT I)

<table>
<thead>
<tr>
<th>USSR</th>
<th>Imposed Limitations</th>
<th>USA</th>
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<tbody>
<tr>
<td>1 526</td>
<td>ICBM</td>
<td>1 054</td>
</tr>
<tr>
<td>950</td>
<td>SLBM</td>
<td>700</td>
</tr>
<tr>
<td>42</td>
<td>Nuclear Submarines</td>
<td>41</td>
</tr>
</tbody>
</table>

- Treaty limited the number of **strategic missile launchers** for both sides **for the level of year 1.7.1972**
- Treaty **did not** limit the number of heavy bombers
- Treaty **did not** limit the number of nuclear warheads

- Treaty forbade **reequipment of light missile launchers and old types missile launchers into heavy missile launchers** which in fact meant limitation of Soviet heavy missile launchers
1979 Strategic Arms Limitation Treaty (SALT II)

- Signed in Vienna on June 18, 1979
- Never entered into force (not ratified by US)

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1979 Strategic Arms Limitation Treaty (SALT II)

- Limited the number of missile launchers for **strategic nuclear missiles** to 2400 units (2250 from January 1, 1981)

- Limited the number of missile launchers equipped with **MIRV** to 1320 units

- As part of the **2250 level**, the agreement created these **sublevels**:  
  - No more than 1320 launchers of ICBMs, MIRVed SLBMs and ALBMs, and Heavy Bombers with MIRVed ALCM  
  - Of these, no more than 1200 ICBM and SLBM launchers  
    - Of these, no more than 820 MIRVed ICBMs

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Nevertheless up to mid 80s both sides adhered to the agreed levels.

In May 1986 in the course of implementation of the program of deployment of heavy bombers with cruise missiles USA exceeded the sublevel for launchers and heavy bombers with ALCMs.

Was sharply criticized in the USA.

In autumn of 1979 it was recalled from the US Senate under the pretext of Soviet military interference into internal affairs of Afghanistan.
1987 Intermediate-Range Nuclear Forces Treaty (INF Treaty)

- In the beginning of the 80s **USSR started deployment of SS-28 “Pioneer” missiles in the European part of the country**, in response the **USA started deployment of “Pershing’ and cruise missiles in Europe**

- Signed **in Washington on December 08, 1987**

- Effective from **June 1, 1988 (no time limit)**
1987 Intermediate-Range Nuclear Forces Treaty (INF Treaty)

➢ The first agreement that led to a real reduction on nuclear arms

➢ Elimination of all Soviet and American medium (1000-5000 km) and short (500-1000 km) range missiles (in the course of three years)

➢ Asymmetrical reduction (USSR destroyed 1846 missiles, the US only 846)

➢ Under the terms of the INF Treaty, the USSR also had to destroy its newest tactical weapon system, the SS 23 Spider, even though its range was under 500 km

➢ For the first time, inspection activities were made legally possible (for thirteen years; up to 31.05.2001)

➢ For the first time, concrete procedures of elimination of hardware were agreed.

➢ In the first six months of the implementation of the Treaty it was allowed to eliminate up to 100 missiles by means of launch.

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1991 Strategic Arms Reduction Treaty (START-1)

➢ Signed in Moscow on 31 July 1991 but entered into force only after three years because of the need to solve a number of problems caused by the disintegration of the Soviet Union.

➢ Additional Protocol to the Treaty was signed by Russia, Belarus, Ukraine and Kazakhstan and the USA in Lisbon on May 23, 1992. According to the Protocol, Russia became the only successor of the USSR in the terms of the Treaty.

➢ Belarus, Kazakhstan and Ukraine made obligation to join NPT Treaty as non-nuclear states.
1991 Strategic Arms Reduction Treat (START-1)

- The number of warheads was decreased to 6000-6500 for each of the parties;
- The number of delivery vehicles was reduced to 1600 units for each party, with no more than 154 heavy ICBM and SLBM (with weight more that 100 tones);
- The number of sea-launched cruise missiles with a range of over 600 km was reduced to 880 units (changes introduced by a political decision, not by provisions of the Treaty).
- Heavy ICBM-more than 150 tons; P36M2(1988)-the heaviest ICBM. Weight-211t,distance-10000km;
- Ten MIRVs-750kt-each;
- Was terminated in December, 2009

- Contained a number of limitations on modernization of existing and creation of new strategic offensive weapons:
  - heavy ICBMs of new types;
  - mobile launchers of heavy ICBMs;
  - ban on reequipping of silos for heavy ICBMs;
  - heavy SLBMs;
  - ICBMs and SLBMs with more than 10 warheads;
  - no more than 154 heavy ICBMs;
  - means of speedy reloading;
  - nuclear ALCMs with more than one warhead;
1993 Strategic Arms Reduction Treaty (START-2)

- No more than 3000-3500 warheads, by January 1\textsuperscript{st} 2003
  - Of these, no more than \textbf{1700-1750} SLBMs
- Elimination of all MIRVed ICBMs
- Elimination of all heavy ICBMs

- Signed \textbf{on January 3, 1993}
- In fact – \textbf{the continuation of START-1 (the same procedures and provisions)}
- In force till the \textbf{end of implementation of START-1}

- The most painful provision for Russia – \textbf{elimination of heavy ICBMs and ICBMs with MIRVs. Limitations for SLBMs} were considerably weaker
In 1997 Protocol on Prolongation of the Period of Elimination plus Protocol on Differentiation Between Strategic and Nonstrategic Ballistic Missile Defence Systems were signed as a single packet with START-2. The US Senate refused to ratify the protocols.

In 2002 after the USA withdrew from ABM Treaty Russia refused to implement START-2.
2002 Treaty on Strategic Offensive Reductions (SORT 2002; Treaty of Moscow 2002)

➢ No more than 1700-2200 operationally deployed warheads

➢ No verification provisions

➢ Agreement did not require the destruction of dismantled warheads
No more than 1,550 nuclear warheads for each party

No more than 800 strategic delivery vehicles for each side, of which no more than 700 can be deployed
Further reductions of nuclear weapons

Enhancing transparency and strengthening verification measures

Involving all nuclear states the disarmament process

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Missile Defense

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Russia’s Missile Defense Core Principles

- Equal and indivisible security as the fundamental element of regional and global security
- Inextricable link between strategic offensive and defensive armaments
- Key role of mutual nuclear deterrence in providing global security and stability
In accordance with 1972 ABM Treaty US and Russia made following commitments:

- to have only one ABM deployment site with not more that 100 interceptors;
- to impose limitations on their ABM systems;
- not to deploy nationwide ABM systems;
- not to deploy effective regional ABM systems;
- not to create sea-based, air-based, space-based and mobile ABM systems;
- not to enhance radar stations with ability of countering ICBM’s.
Announced by US President Ronald Reagan on March 23, 1983

The SDI goal was a creation of nationwide ABM system for US and its allies territories protection from nuclear missile strike from the territory of USSR

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ABM Agreements in the 1990s

Joint Russian-American Statement on Global Protection System (Washington, 17 June 1992)

Joint Statement Concerning Anti-ballistic Missile Treaty (Helsinki, 21 March 1997)

Standing Consultative Commission Regulations (New York, September 26, 1997)

First Agreed Statement on ABM Treaty (New York, September 26, 1997)

Fact Sheet on First Agreed Statement on ABM Treaty

Second Agreed Statement on ABM Treaty (New York, September 26, 1997)

Agreement on Confidence-Building Measures (New York, September 26, 1997)

Fact Sheet on Second Agreed Statement on ABM Treaty

Memorandum of Understanding on Succession (New York, September 26, 1997)
USA plans on the creation of the third position area
**The European Phased Adaptive Approach**

**Phase I (2011)**
Deployment of the ships with “SM-3 Block IA” interceptors in Aegean, Adriatic and Mediterranean sea.

**Phase II (2011-2015)**
Deployment of the base with “SM-3 Block IB” interceptors in Romania.

**Phase III (2015-2018)**
Deployment of the base with “SM-3 Block IIA” interceptors in Poland. Replacement of deployed ABM systems with “SM-3 Block IIA” interceptors.

**Phase IV (2018-2020)**
Deployment of modified “SM-3 Block IIB” interceptors in Poland which have the potential to counter ICBMs and SLBMs.

- South European countries protection from short-range missiles.
- South and south-eastern European countries protection from short-range missiles.
- European countries protection from intermediate-range missiles.
- European countries protection from ICBMs.

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Russia’s Sectoral Approach

NATO-Russia Joint System Of Combat Control
(information exchange and target distribution)
### Comparative evaluation of the approaches toward creation of Euro-ABM

<table>
<thead>
<tr>
<th>Element of the Euro-ABM system</th>
<th>Russian offer («sectoral approach»)</th>
<th>NATO offer («cooperative system»)</th>
<th>Evaluation of position conjunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defence zone</td>
<td>Joint, with sectoral responsibility</td>
<td>Two independent zones</td>
<td>No</td>
</tr>
<tr>
<td>Responsibility</td>
<td>For the interception of any ballistic missile attacking Europe in own “sector”</td>
<td>NATO – for NATO territory, Russia – for Russian territory</td>
<td>No</td>
</tr>
<tr>
<td>Information</td>
<td>Full exchange of characteristics, target acquisition data, target distribution, evaluation of results</td>
<td>Limited exchange of target acquisition data, joint maneuvers</td>
<td>No</td>
</tr>
<tr>
<td>Target effects</td>
<td>All ballistic missiles in the responsibility zone</td>
<td>Only ballistic missiles attacking the responsibility zone (including neighboring zones)</td>
<td>No</td>
</tr>
<tr>
<td>Decision to strike</td>
<td>On the national level</td>
<td>On the national level</td>
<td>Yes</td>
</tr>
<tr>
<td>“Buffer” zone</td>
<td>Is not required (possible outside trajectories of Russian ICBM)</td>
<td>Possible (due to the overlapping NATO and Russian zones over Russian territory)</td>
<td>No</td>
</tr>
</tbody>
</table>
Russian proposals for mutually acceptable decisions

Criteria
➢ technical performances of BMD components (interceptor’s speed, number of interceptors, radar range, control system capabilities)
➢ deployment sites
➢ capabilities for interception of various types of BMs at boost, midcourse and terminal phases of flight

joint familiarization with European BMD deployment plans and its implications for the relevant strategic deterrence capabilities.

development of verification measures to assure security of strategic capabilities.

legally binding agreements defining mutual obligations of the pertinent parties to deploy a European BMD system providing equal security to all participants

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Counter measures of the Russian Federation

➢ Increase in protection of the fixed launchers at basing sites,
➢ Provision of maximum uncertainty of the strategic nuclear forces mobile launchers location, повышение готовности ракетного оружия к применению,
➢ Increasing capabilities of ICBM to overcome modern ballistic missile defence,
➢ Decrease in time needed to detect launch of attacking missiles,
➢ Increase amount of sources of information in order to secure target assignment for Russian air defence and ballistic missile defence,
➢ Usage of effective measures for combating mobile ballistic missile defence,
➢ Securing the capability to hit or disruption of the functioning of the separate elements of the ballistic missiles defence infrastructure (ABM launchers, control points, space detecting devices).

All mentioned measures would be implemented only as reciprocal moves as the threat for our strategic nuclear forces from the ABM deployed by the USA and NATO would increase. Our answer will be adequate, economically balanced and effective.
Tech Criteria for Nontargeting

- **velocity** of interceptor
- **number** of deployed interceptors;
- **fixed BMD sites** and **patrol areas** for mobile BMD systems
- **size** of killing zone
- **propellant budget** and **angular coverage** of BMD radar

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Sea-based, Baltic sea, speed 3 km/s

Trajectory outside the engagement range, interception is impossible
Sea-based, Norwegian sea, speed 3 km/s

Trajectory outside the engagement range, interception is impossible
Sea-based, Baltic sea, speed 4 km/s

Trajectory outside the engagement range, interception is impossible
Sea-based, Norwegian sea, speed 4 km/s

Trajectory outside the engagement range, interception is impossible
Sea-based, Baltic sea, speed 5 km/s

Interception is possible
Sea-based, Norwegian sea, speed 5 km/s

Interception is possible
Gabala Radar Station

Provides control for the up to 75% missile launches from the Southern direction
Armavir Radar Station

Provides control for the 100% missile launches from the Southern direction
1. Abandoning the implementation of "Phase IV of the adaptive approach to building the European segment of the U.S. missile defense"

2. Interceptors, meant for deployment in Poland, will be based in Alaska

**Source:** US Department of Defence
Conclusions

➢ Speed of the countermissile and deployment area of the ABM facilities are the most important indicators

➢ Critical speed for the countermissile is 5 km/s

➢ Exceeding this speed parameter would create a real threat for the Russian containment potential

➢ In Russian-American agreements on ABM delimitation (1997) following speed for missiles was fixed:
  ➢ land- and air-based - 5.5 km/s
  ➢ sea-based – 4.5 km/s
The 2018 Nuclear Posture Review

- The Triad: Present and Future:

  - Submarines (SSBNs) armed with submarine-launched ballistic missiles (SLBMs) (currently 14 OHIO-class SSBNs which will be replaced by 12 COLUMBIA-class SSBNs);

  - Land-based intercontinental ballistic missiles (ICBMs) (currently 400 single-warhead Minuteman III, in 2029 they will be replaced by the same number of the new generation ICBMs);

  - Strategic bombers carrying gravity bombs and air-launched cruise missiles (ALCMs) (currently 46 nuclear-capable B-52H and 20 nuclear-capable B-2A strategic bombers which will be replaced by next-generation bomber, the B-21 Raider;

  - Non-strategic nuclear forces (currently B-83-1 and B-61-11 gravity bombs which will be replaced by B-61-12 bombs in 20200.
2019 Missile Defense Review (MDR) is consistent with the 2018 NSS, the 2018 National Defense Strategy (NDS), and the 2018 Nuclear Posture Review (NPR)

Key points:

➢ It demands a concerted U.S. effort to improve existing capabilities for both homeland and regional missile defense.
➢ 2019 MDR emphasizes that the missile threat environment now calls for a comprehensive approach to missile defense against rogue state and regional missile threats.

I. Introduction
II. The Evolving Threat Environment
III. Roles, Policy, and Strategy
IV. U.S. Missile Defense Programs and Capabilities
V. Missile Defense Management and Testing
VI. Working with Allies and Partners
VII. Conclusion
Key priorities:

- The United States will continue to defend the homeland against the threat of limited ballistic missile attack.
- The United States will defend against regional missile threats to U.S. forces, while protecting allies and partners and enabling them to defend themselves.
- Before new capabilities are deployed, they must undergo testing that enables assessment under realistic operational conditions.
- The commitment to new capabilities must be fiscally sustainable over the long term.
- U.S. BMD capabilities must be flexible enough to adapt as threats change.
- The United States will seek to lead expanded international efforts for missile defense.
Current and Emerging Missile threats to the American Homeland:

Russia considers the United States and NATO to be the principal threat to its contemporary revisionist geopolitical ambitions and routinely conducts exercises involving simulated nuclear strikes against the U.S homeland. Russian strategy and doctrine emphasize the coercive and potential military uses of nuclear weapons, particularly including nuclear armed offensive missiles and has sought to enable this strategy through a comprehensive modernization of its strategic and theatre missile arsenals. As counted under the 2010 New START Treaty, Russia is permitted a total of 700 deployed ICBMs, SLBMs and heavy bombers and 1550 deployed strategic nuclear warheads. Russian leaders also claim that Russia possesses a new class of missile, the hypersonic glide vehicles, which maneuver and typically travel at velocities greater than Mach 5 in or just above the atmosphere.
Tactical Nuclear Weapons

- **Tactical Nuclear Weapons** include all nuclear weapons except for strategic nuclear warheads for ICBMs and SLBMs and nuclear bombs and ALCMs for strategic bombers as defined by new START Treaty; as well as nuclear weapons that have been retired from stockpile, are no longer functional and are in the queue for dismantlement.

According to rough estimate, the number of operationally deployed Russian tactical nuclear weapons is **2-3 times** larger comparing to the USA.

**How many?**

- Russia – around **2000** (cruise missiles of various ranges, gravity bombs, torpedoes, and mines)
- United States – **690** (100 SLCM Tomahawk, 190 warheads for the SLCM Tomahawk W-80-0 in warehouses, 400 W-61 gravity bombs, and out of these 200 are in Europe: Belgium, Italy, Netherlands, Turkey, and Germany)

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Tactical Nuclear Weapons

Modern Agenda

- Measures to ensure transparency
  - More openness with respect to weapon stockpiles and warheads awaiting disposal
  - Separation of warheads and delivery vehicles
  - Security measures enhancing
  - Reaching a non-increase commitment
- Inclusion of tactical nuclear weapons in the new nuclear arms reductions treaty

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Strategic Non-Nuclear Weapons

- Prompt Global Strike – United States military effort to develop a system that can deliver a precision conventional weapon strike anywhere in the world within one hour
- Lower level of responsibility for the use of such weapons, when compared with nuclear weapons, with comparable effect
- The problem of warheads’ identification (the Russian early warning system cannot detect what kind of warhead the missile is equipped with)
Space Activity in the World: The Modern Stage

There are **125 countries** involved in space activity. **20 of them** are the most active ones.

**1957 operating satellites** are located in the outer space:
- USA – 849, Russia – 152, China – 284, other countries combined - 672

56 satellites are expected to be launched by the end of 2019.

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Satellites Launched (including lost ones)</th>
<th>Country</th>
<th>Number of Satellites Launched (including lost ones)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>43</td>
<td>India</td>
<td>17</td>
</tr>
<tr>
<td>China</td>
<td>37</td>
<td>Japan</td>
<td>10</td>
</tr>
<tr>
<td>Russia</td>
<td>31</td>
<td>North Korea</td>
<td>2</td>
</tr>
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<td>Europe</td>
<td>12</td>
<td>Canada</td>
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<td>Spain</td>
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<td>Austria</td>
<td>1</td>
<td>Peru</td>
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<td>Italy</td>
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<td>Israel</td>
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<td>France</td>
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<td>Algeria</td>
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<td>Germany</td>
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<td>Argentina</td>
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<tr>
<td>Luxembourg</td>
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<td>Philippines</td>
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<td>Belgium</td>
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<td>Denmark</td>
<td>1</td>
<td>Thailand</td>
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</tr>
<tr>
<td>Indonesia</td>
<td>2</td>
<td></td>
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</tr>
</tbody>
</table>

Number of satellites launched by each country in 2018

*Source: UCS Satellite Database*

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Military space activities not covered by international agreements

Creation and use of space systems, which are able to perform the following:

- Radio and Communications reconnaissance;
- Communications and data relay;
- Surveillance, detection, and position-revealing systems

Creation and use of space combat weapons systems

- Outer space strike systems;
- Anti-missile and anti-satellite systems;
- Electromagnetic warfare systems and electro-optical suppression systems

Laser weapons
Beam weapons
Kinetic weapons
Electromagnetic weapons

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Russia's position on confidence-building and arms control in space

**Russian Initiatives**

| Russian-Chinese initiative (Treaty on Space Weapons) on the Disarmament Conference 2002. In 2008 the draft of this treaty was submitted for international consideration in the framework of the Conference. In 2014 on the Disarmament Conference the renewed draft of this document was submitted, in which the considerations of the participants were noticed and some of the provisions and terms were specified. |
| Initiative for measures of transparency and confidence building on matters of non-space |
| Adoption of the Resolution “No first placement of weapons in outer space” by the UN General Assembly in 2014 |
| • The inter-state exchange of information about their space policy; |
| • The exchange of information on major programs of exploration and use of outer space |
| • Verification measures |
| • Providing notification of space activities undertaken |
| • Consultations and seminars |

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Role of International Law

- Hard law = 5 UN treaties on space, ITU; soft law = UN principles, UN voluntary agreements, standards, practice

- **UN Treaties**
  - 1967 OST: “Magna Carta” of space
  - Exploration/use “for the benefit and in the interest of all countries, and shall be the province of all mankind”
  - Bans nukes in space (not conventional weapons)
  - Prohibits “national appropriation” of space/celestial bodies
  - 1968 Rescue Agreement: astronauts and space objects
  - 1972 Liability Convention: “absolute liability” for re-entry damage; “fault based” liability for orbital damage

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UN Treaties

- 1976 Registration Convention
  - States/international organizations required to establish own registries, transfer information for inclusion in UN Register
  - Requires basic orbital parameters, general function, date/location of launch
  - 92% of all sats registered, but major space actors play fast and loose on national security sats

- 1984 Moon Convention: no major space actor has ratified, thus not effective

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ITU

- ITU, a specialized UN agency, governs access to RF usage/orbital slots in GEO
- Purpose: to promote efficient and equitable use of RF/orbits
- Prohibits deliberate and illegal interference
International Soft Law

- 5 UN Principles, politically but not legally binding
- Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, 1963
- Free exploration/use by all, ban on sovereignty, “benefit and interests of all mankind”
- Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcast, 1982
- Non-intervention, equal rights and benefits, peaceful dispute resolution, state responsibility for activities
UN Principles

- Principles Relating to Remote Sensing of the Earth from Outer Space, 1986
  - Requires international cooperation, technical assistance
  - Encourages data sharing

- Principles Relevant to the Use of Nuclear Power Sources in Outer Space, 1992
  - Seeks to minimize radioactivity in space, limits nuke power sources to uses that cannot otherwise be done, safety requirements, re-entry notification

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UN Principles, cont’d

• Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking Into Particular Account the Needs of Developing Countries, 1996

  • Promotes international cooperation, especially with developing states, capacity-building, tech transfer
Soft Law: UN Voluntary Agreements

- COPUOS, STSC 2007 Debris Mitigation Guidelines
  - Based on technical standards developed by IADC
  - Primarily aimed at safety
  - Article 4 addresses security by pledging States not to deliberately create “long-lived” debris, which could be seen as limiting KE-ASAT test/use

- COPUOS Long Term Sustainability Working Group
  - 12 guidelines for best practices approved June 2016
  - Primarily aimed at safety but also space environment
  - Working on more guidelines through 2018
UN Voluntary Agreements, cont’d

- UN GGE on Transparency and Confidence-Building Measures in Outer Space Activities
  - Report issued in 2013
  - Under UN First Committee, thus aimed squarely at space security and reducing risks of conflict