ITU Workshop for Europe on
Mapping of Terrestrial Broadband Infrastructure
Bridging Digital Divide and Fostering Investment Opportunities
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BroadbandCalculator.online: automated system of choosing the most promising solution for building broadband access networks

Vadym Kaptur

Ph.D., Senior Researcher
Vice-Rector on Scientific work O.S. Popov ONAT
Vice-Chairman ITU-D Study Group 1
co-Rapporteur on Question 1/1 of ITU-D SG 1

Modern approaches to choosing the most suitable solution for building telecommunications networks

Approach 1. Evaluation of current trends and analysis of best practices

Key advantage: simplicity (low level of labor effort)

Key disadvantage: the conclusion is made on the basis of another's experience, not adapted to concrete realities

Approach 2. Expert assessment taking into account the current situation

Key advantage: possibility of taking into account the existing situation

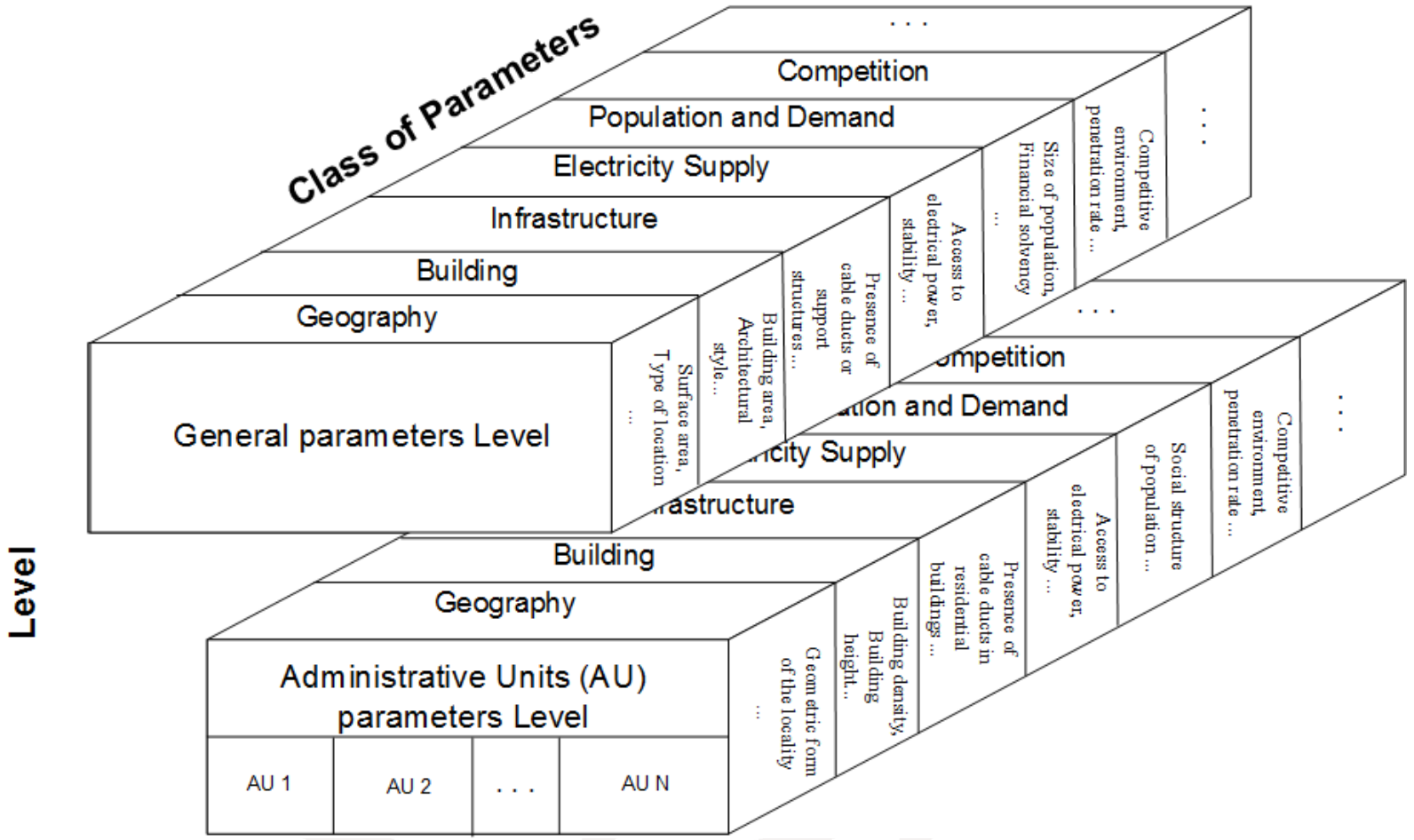
Key disadvantage: high level of subjectivity, lack of economic evaluation

Approach 3. Simulation modeling for the purpose of economic feasibility assessment

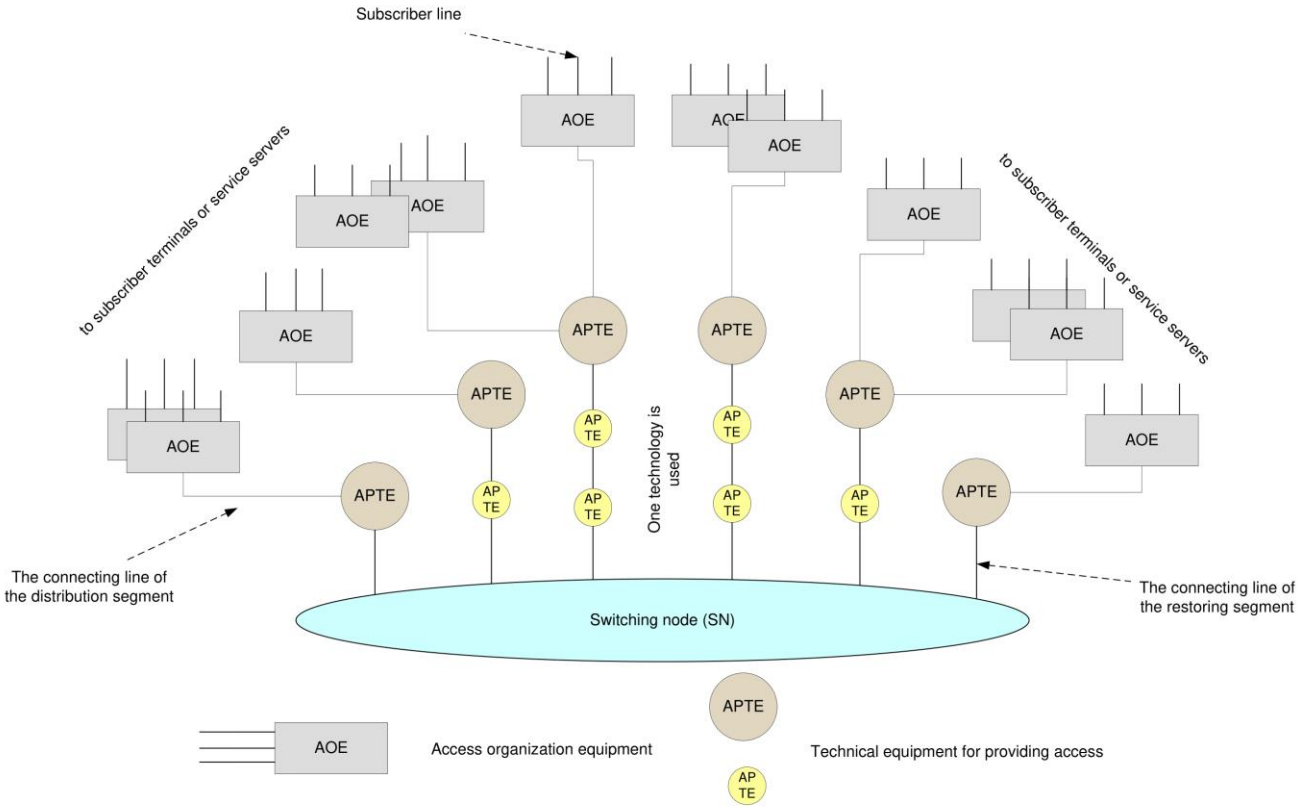
Key advantage: high level of objectivity, possibility of taking into account economic feasibility

Key disadvantage: complexity (high level of labor effort)

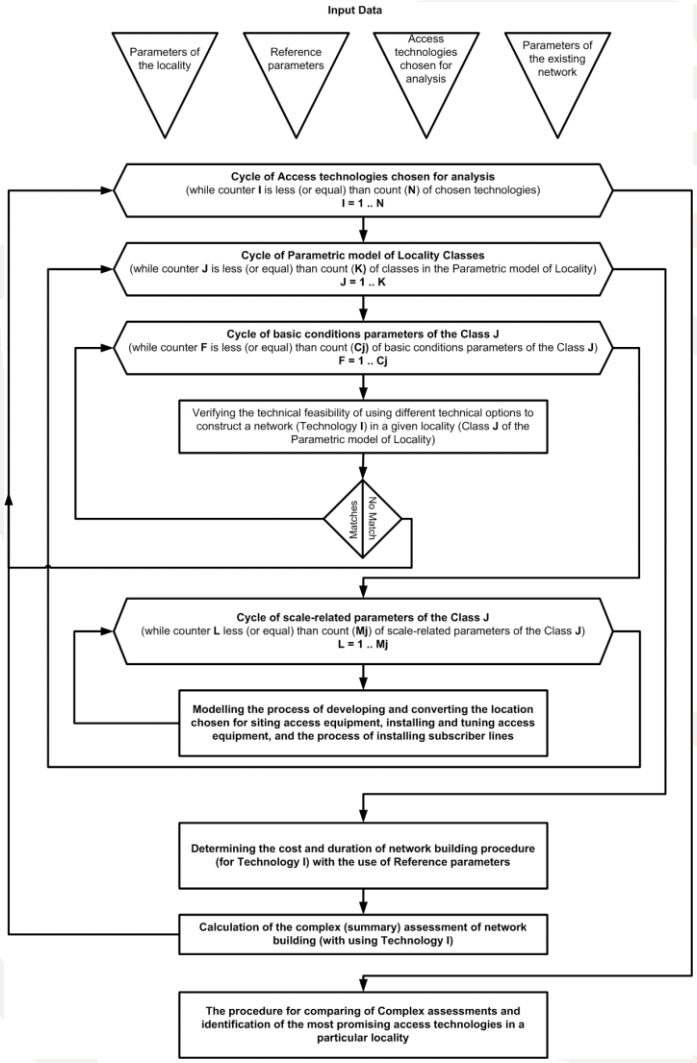
Generalized model of a typical settlement



Access network: three segments



Main algorithm of the methodology



Step 1. Estimation of the possibility of building a network using a certain technology

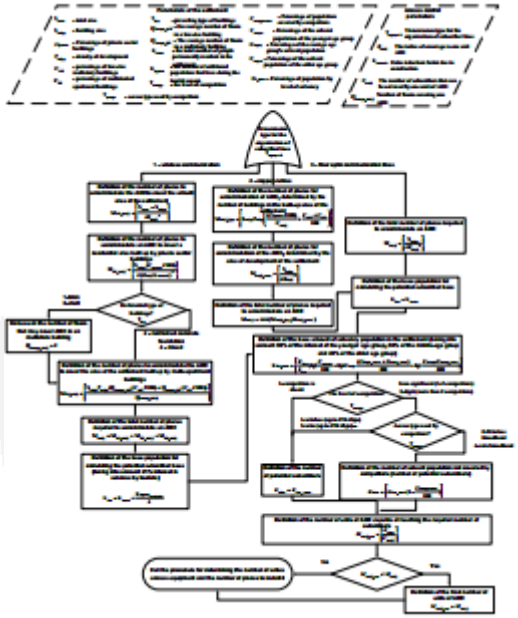
Step 2. Determining the cost and duration of the construction of the access network :

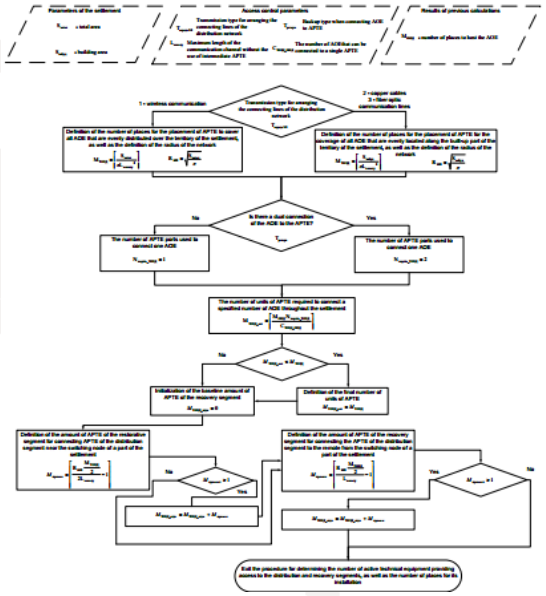
- Step 2.1. Determination of the number of active equipment and the number of places for its installation
- Step 2.2. Determination of the length of communication lines and necessary duct
- Step 2.3. Determination of the cost of equipment and materials
- Step 2.4. Determination of the cost and duration of work

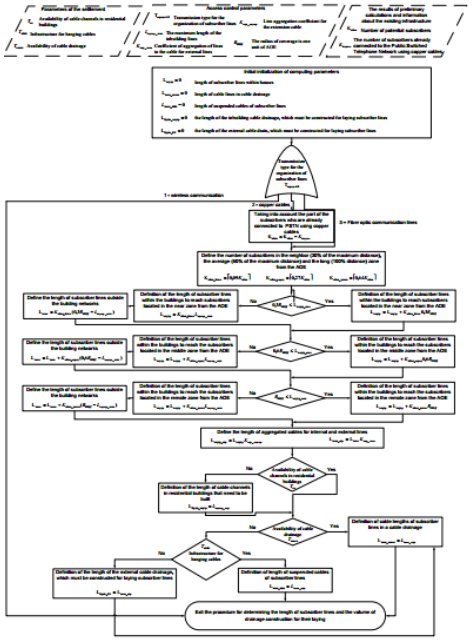
Step 3. Selection of the most promising technical solution:

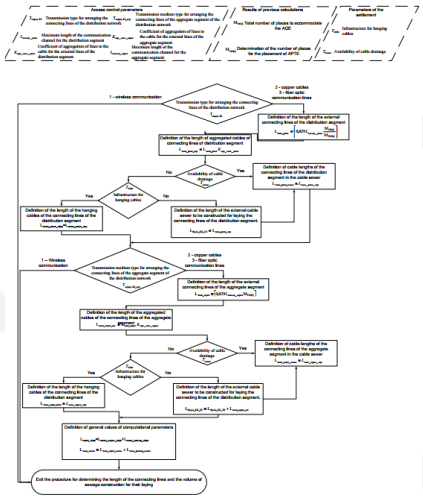
- Step 3.1. Determining the cost of an access network operating
- Step 3.2. Determining «net cash flow»

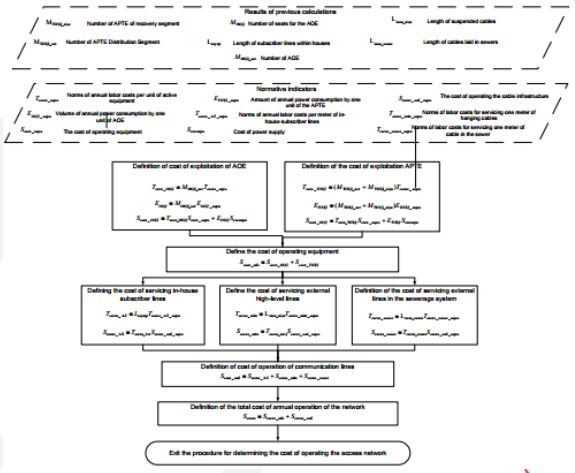
Simulation model as a basis of System











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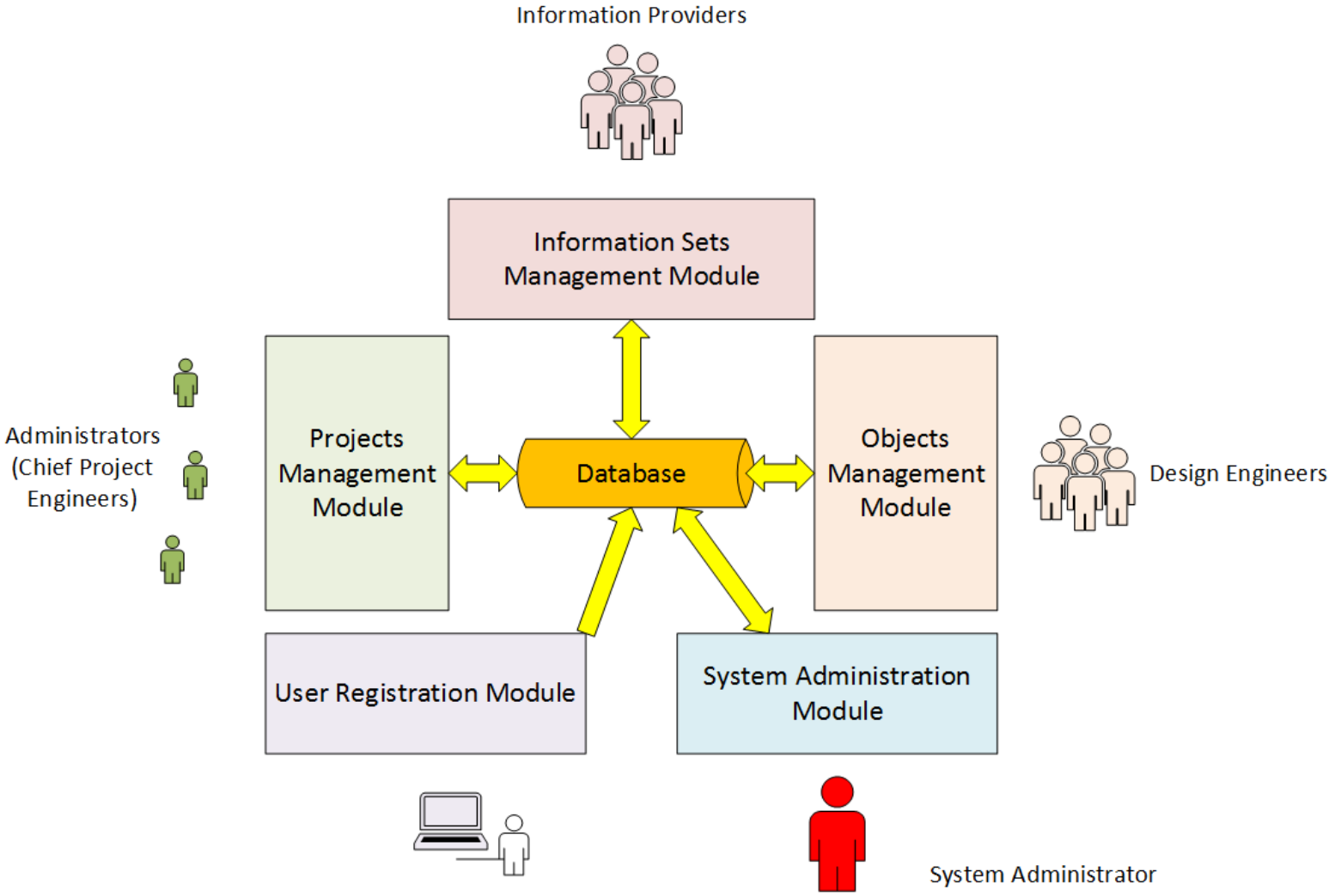

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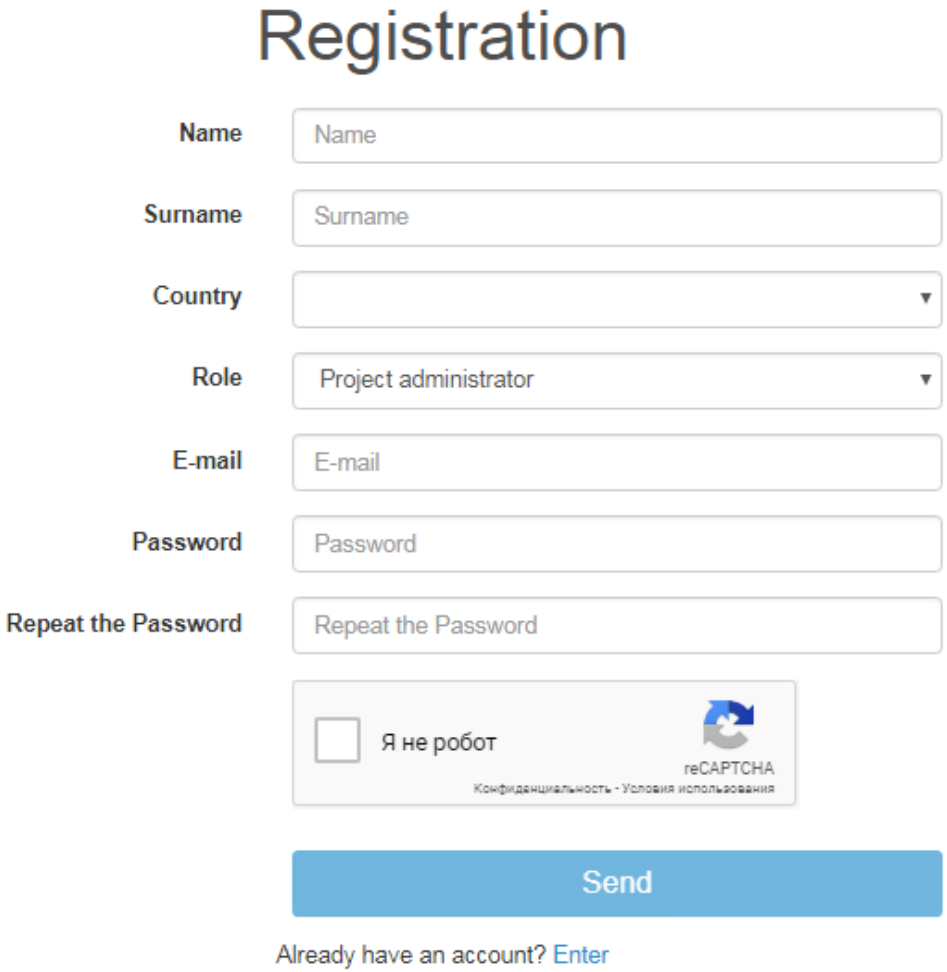

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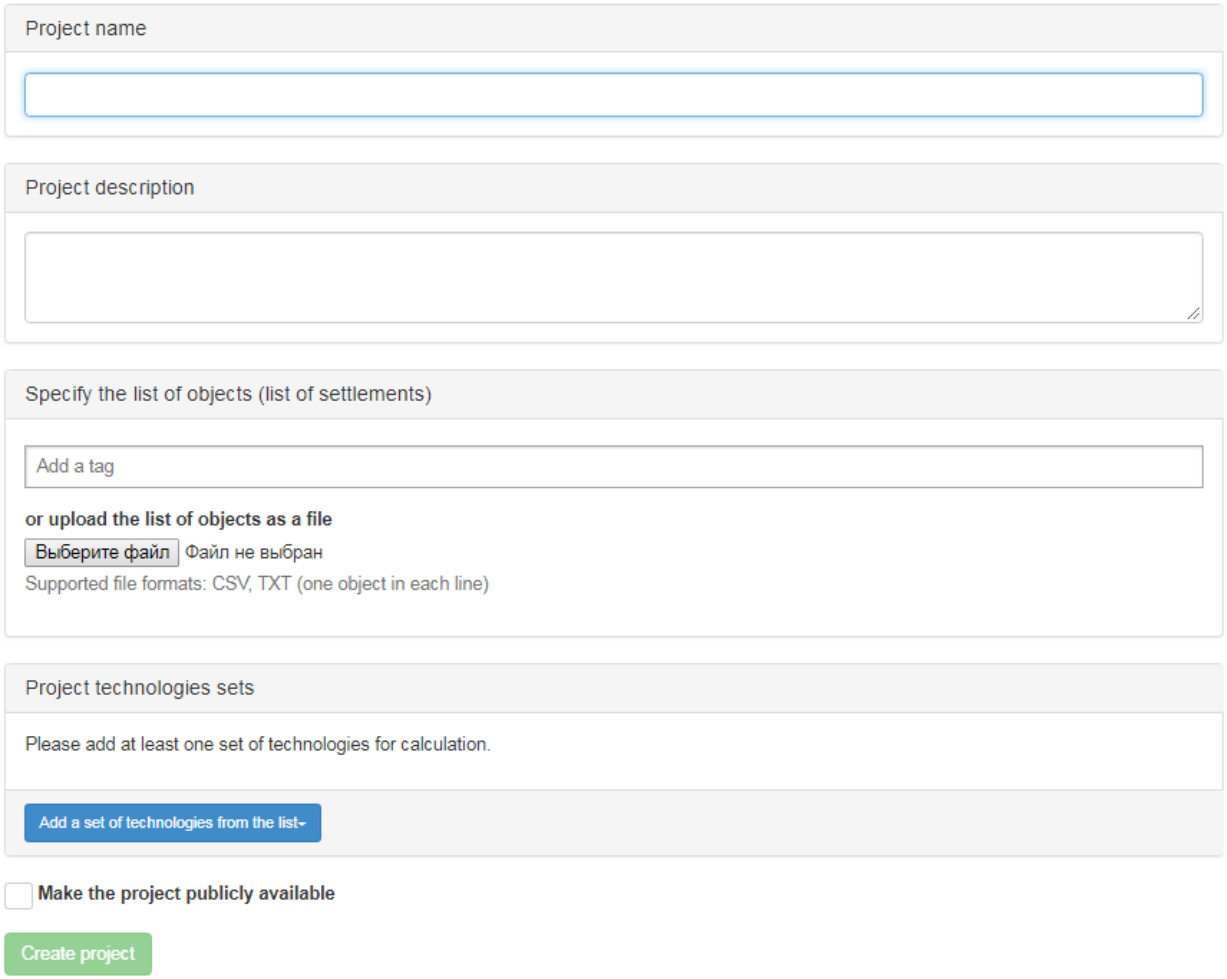

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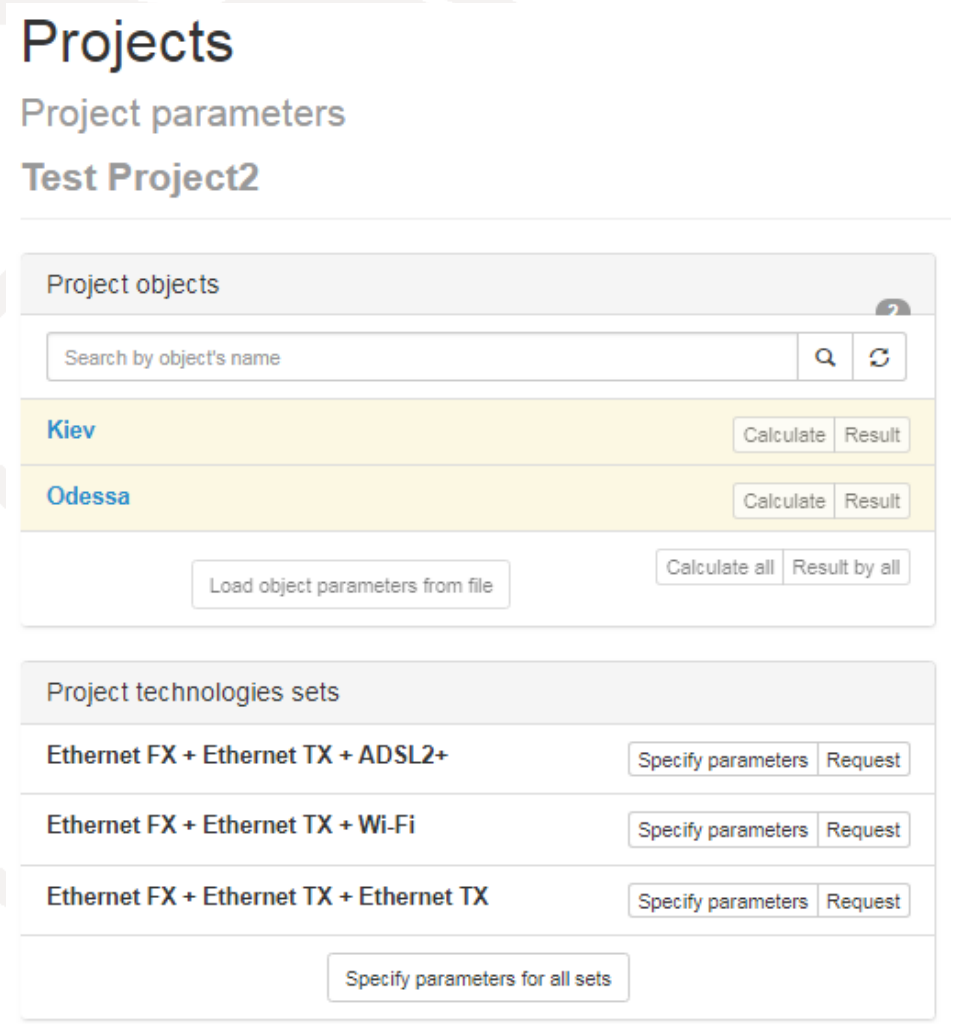

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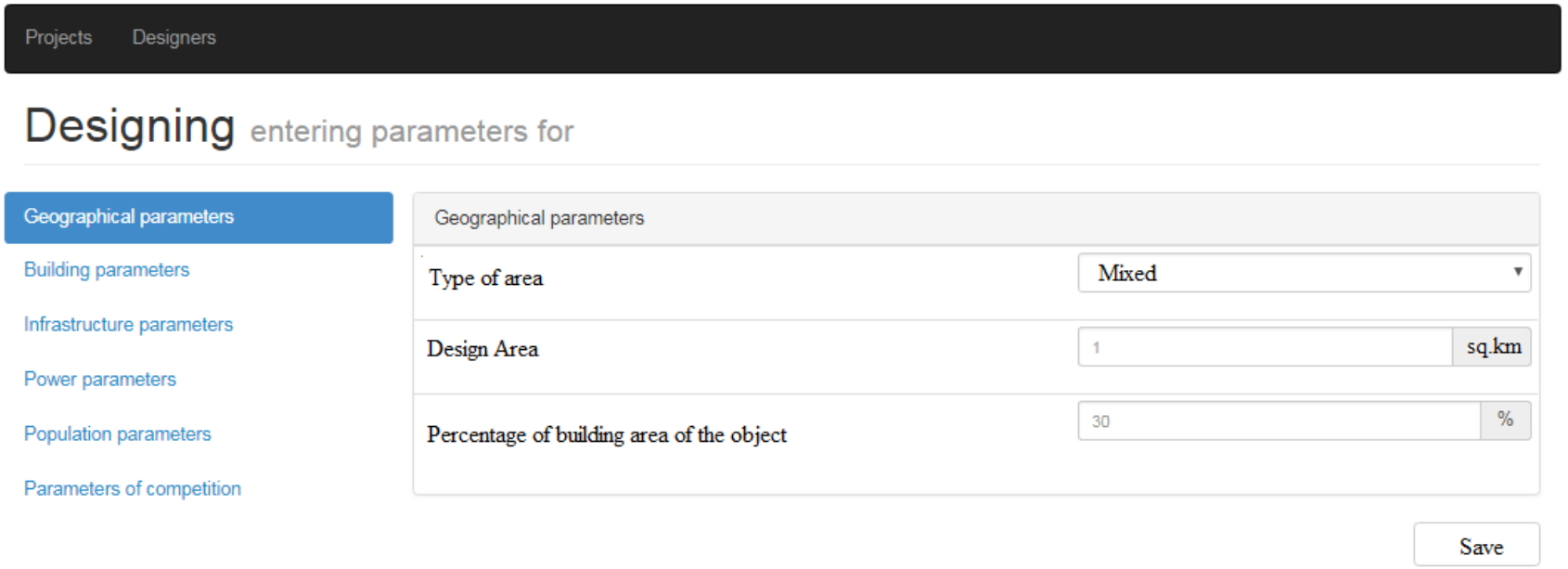

List of variables

Description	Options
Type of area	1:Flat terrain;2:Mountain;3:Mixed
Design Area	sq.km
Percentage of building of the object area	%
Building density	buildings/sq.km
Percentage of private sector buildings	%
Percent of low-rise multi-apartment buildings	%
The percentage of high-rise multi-apartment buildings	%
Average number of floors in a low-rise building	units
Average number of floors in a high-rise building	units
The predominant type of building material	1:Brick;2:Reinforced concrete base;3:Coquina;4:Mixed
The predominant architectural style of buildings	1:Historical buildings, monuments of architecture;2:Buildings that have no historical value;3:Mixed
The presence of cable ducts	1:Yes;2:No;3:Partially
The presence of infrastructure for hanging cables	1:Yes;2:No;3:Partially
The presence of cable channels in residential buildings	1:Yes;2:No;3:Partially
Presence of restrictions on the use of wireless technologies (occupation of RFR, specialized facilities, etc.)	1:Yes;2:No;3:Partially
Availability of infrastructure for power supply of intermediate nodes	1:Yes;2:No;3:Partially
Power supply quality	1:Normative;2:Average;3:Low
Number of residents living in this facility on an ongoing basis	peop
The amount of additional population living in this facility simultaneously during the tourist period	peop
The penetration level of access networks	1:No access networks;2:Access networks are developed insignificantly;3:Access networks are developed significantly
Access type used by other operators	1:Wireless (up to 256 Kbps);2:Wireless (over 256 Kbps);3:Wired (up to 256 Kbps);4:Wired (over 256 Kbps)
Percentage of population covered by broadband access	%
Percentage of the population of the younger age group (up to 25 years old) who are interested in services	%
Percentage of population of the middle age group (from 25 to 55 years old) who are interested in services	%
Percentage of the population of the older age group (over 55 years old) who are interested in services	%

List of variables

Description	Options
Percent of tourists who are interested in services	%
Nepotism rate (the average number of people in the family)	peop
The percentage of solvent population of the younger age group (up to 25 years old)	%
The percentage of solvent population of the middle age group (from 25 to 55 years old)	%
Percentage of solvent population of the older age group (over 55 years old)	%
Cost of electricity	c.u./kW*h
Discount rate	%
Corporate tax rate	%
The average life time of the equipment	years
Average month income per one subscriber	c.u.
Value-added tax rate	%
Type of transmission medium for organization of subscriber lines	1:Wireless communication;2:Using copper cables;3:Using fiber-optic
Type of transmission medium for the organization of trunks of the distribution network	1:Wireless communication;2:Using copper cables;3:Using fiber-optic
The type of transmission medium for the organization of trunks of the aggregate segment of the distribution network	1:Wireless communication;2:Using copper cables;3:Using fiber-optic
Use of a licensed RFR or RFR of restricted use	1:No use of RFR is expected;2:Use of the RFR is not licensed;3:The use of a licensed RFR is expected
Type of backup of connecting AOE to TAOE	1:Not intended;2:Double connection of AOE to the distributive TAOE is expected
The radius of the territory coverage by one unit of AOE (the maximum length of subscriber lines, the distance of signal propagation in the absence of buildings, etc.)	km
The number of subscribers that can be served by one unit of AOE (the number of subscriber ports, the number of subscribers that form the maximum number of simultaneous connections, etc.)	peop
Number of floors covered by one AOE unit	floors
Number of AOEs that can be connected to one TAOE	units
Maximum length of the communication channel for the distribution segment	km
Maximum length of the communication channel without using intermediate TAOE	km
The cost of one unit of AOE	c.u.
The cost of one unit of TAOE of distributive segment	c.u.

List of variables

Description	Options
The cost of one unit of TAOE of intermediate value	c.u.
The cost of special equipment of the switching node	c.u.
The coefficient of the coverage radius reduction due to the building (from 0.01 to 1)	
The maximum length of in-house lines	km
Coefficient of lines aggregation to the cable for external lines	
Coefficient of lines aggregation to the cable for internal lines (from 0.01 to 1)	
Coefficient of lines aggregation to the cable for external lines of distributive segment (from 0.01 to 1)	
Coefficient of lines aggregation to the cable for external lines of aggregate segment (from 0.01 to 1)	
Maximum length of the communication channel for the aggregate segment	km
Cost of materials for arrangement of one AOE placement	c.u.
Cost of materials for arrangement of one distributive TAOE placement	c.u.
Cost of materials for arrangement of one renewable distributive TAOE placement	c.u.
Cost of SL cable	c.u./km
Cost of the distribution segment cable	c.u./km
Cost of the aggregate segment cable	c.u./km
Cost of internal duct materials	c.u./km
Cost of external duct materials	c.u./km
The cost of a license to use RFR per one facility	c.u.
The cost of installation work on the arrangement of places for equipment	c.u./h
Cost of works on installation and adjustment of equipment	c.u./h
Cost of duct construction works	c.u./h
Cost of work on the construction of internal duct	c.u./h
Cost of works on installation of subscriber lines	c.u./h
Cost of work on cable suspension	c.u./h
The cost of laying the cable in the duct	c.u./h
Standard of labor costs for the arrangement of a place for the TAOE	peop*h
Standard of labor costs for the arrangement of a place for the AOE	peop*h
Standard of labor costs for installation of equipment	peop*h
Standard of labor costs for the construction of internal duct	peop*h/km
Standard of labor costs for the construction of cable duct	peop*h/km
Standard of labor costs for laying the cable in the duct	peop*h/km
Standard of labor costs for the cable suspension	peop*h/km
The percentage of standard expenses for design	%
The volume of annual power consumption of one unit of AOE	kW*h
The volume of annual power consumption of one unit of TAOE	kW*h
Cost of work on the equipment operation	c.u./h
Cost of work on the operation of cable infrastructure	c.u./h
The norm of the annual labor costs for maintenance of one meter of suspended cable	h/km
The norm of the annual labor costs for maintenance of one meter of cable in the duct system	h/km
The norm of the annual labor costs per meter intrahouse subscriber lines	h/km
The norm of the annual labor costs per unit of active equipment	h/units
The norm of labor costs на строительство абонентских линий	peop*h/km
Period of Investment Payback	years

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Technogies	NPV
FSO + WiMax + ADSL2+	354159000
10GEPON + Wi-Fi + ADSL2+	354053000
Ethernet FX + Ethernet TX + ADSL2+	354036000
Ethernet FX + WiMax + ADSL2+	354035000
10GEPON + Ethernet TX + ADSL2+	354033000
POS (SDH) + Ethernet TX + ADSL2+	354028000
10GEPON + WiMax + ADSL2+	354026000
FSO + WiMax + ADSL2+	354004000
POS (SDH) + Ethernet FX + ADSL2+	353985000
Ethernet FX + Wi-Fi + ADSL2+	353972000
SDH no PPЛ + GEPON + ADSL2+	353906000
Ethernet FX + WiMax + ADSL2+	353879000
10GEPON + WiMax + ADSL2+	353870000
FSO + GEPON + ADSL2+	353781000
Ethernet FX + GEPON + ADSL2+	353741000
DWDM + GEPON + ADSL2+	353740000
POS (SDH) + GEPON + ADSL2+	353733000
Ethernet FX + FSO + ADSL2+	352085000
POS (SDH) + GEPON + Ethernet TX	346206000
Ethernet FX + GEPON + Ethernet TX	345757000
Ethernet FX + FSO + DOCSIS	324792000
SDH no PPЛ + Wi-Fi + Wi-Fi	277266000
Ethernet FX + Wi-Fi + Wi-Fi	273400000
POS (SDH) + Ethernet FX + GEPON	246323000
10GEPON + GEPON + GEPON	246144000
10GEPON + GEPON + GEPON	245889000
Ethernet FX + FSO + GEPON	245084000
POS (SDH) + Ethernet TX + Wi-Fi	235589000
10GEPON + Ethernet TX + Wi-Fi	230906000
DWDM + WiMax + Wi-Fi	223264000
Ethernet FX + Ethernet TX + Wi-Fi	222155000
POS (SDH) + Ethernet FX + Wi-Fi	221863000
POS (SDH) + WiMax + Wi-Fi	217731000
SDH no PPЛ + WiMax + Wi-Fi	216010000
DWDM + GEPON + Wi-Fi	212132000
POS (SDH) + GEPON + Wi-Fi	208142000
Ethernet FX + WiMax + Wi-Fi	207378000
SDH no PPЛ + GEPON + Wi-Fi	207128000
Ethernet FX + GEPON + Wi-Fi	200683000
10GEPON + WiMax + Wi-Fi	190110000
FSO + GEPON + Wi-Fi	142236000
FSO + WiMax + Wi-Fi	125971000
Ethernet FX + FSO + Wi-Fi	-90919200
Ethernet TX + WiMax + Wi-Fi	-7450380000

Подробнее

Закрыть

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1  ------------------------------------------------- ------------------------------
2  Ethernet FX + Ethernet TX + Ethernet TX
3  NPV: 2919390
4  ------------------------------------------------- ------------------------------
5  Type of terrain 3 (1: Flat terrain; 2: Mountain; 3: Mixed)
6  Design area 10 sq. Km
7  The percentage of building area of the object 30%
8  Building density 5 buildings / sq. km
9  Percentage of private sector buildings 20%
10 The percentage of low-rise apartment buildings 30%
11 The percentage of multi-storey apartment buildings 50%
12 The average number of floors in a low-rise building is 3 units.
13 The average number of floors in a high-rise building is 6 units.
14 The predominant type of building material is 4 (1: Brick; 2: Reinforced concrete; 3: Coquina; 4: Mixed)
15 The prevailing architectural style of buildings 3 (1: Historical buildings, monuments of architecture; 2: Buildings with no historical value; 3: Mixed)
16 The presence of cable ducts 1 (1: Yes; 2: No; 3: Partially)
17 Presence of cable suspension infrastructure 1 (1: Yes; 2: No; 3: Partially)
18 Availability of cable channels in residential buildings 3 (1: Yes; 2: No; 3: Partially)
19 The presence of restrictions on the use of wireless technologies (employment of HRD, specialized objects, etc.) 2 (1: Yes; 2: No; 3: Partially)
20 Availability of infrastructure for powering intermediate nodes 1 (1: Yes; 2: No; 3: Partially)
21 Power quality 1 (1: Regulatory; 2: Medium; 3: Low)
22 The number of residents who live in this facility on a permanent basis is 10,000 people.
23 The number of additional population living at one time in this object during the tourist period is 100 people.
24 Access type used by other operators 3 (1: Wireless (up to 256 Kbps); 2: Wireless (over 256 Kbps); 3: Wired (up to 256 Kbps); 4: Wired (over 256 Kbps ))
25 Percentage of tourists who are interested in services 50%
26 Media type for subscriber line 2.00 (1: Wireless; 2: Use of copper cables; 3: Use of fiber optic)
27 Media type for distribution network 2.00 (1: Wireless; 2: Copper cables; 3: Fiber use)
28 The type of transmission medium for organizing the connecting lines of the aggregate segment of the distribution network 3.00 (1: Wireless; 2: Using
   copper cables; 3: Using fiber-optic)
29 Use of licensed HRD or HRD limited use 1.00 (1: Do not anticipate using HRD; 2: Using HRD, not licensed; 3: Assuming use of licensed HRD)
30 Type of redundancy when connecting the OOD to the LLP 2.00 (1: Not assumed; 2: Assuming a double connection of the DTE to the distribution LLP)
31 The radius of coverage of the territory with one OOD unit (maximum length of subscriber lines, signal transmission distance in the absence of
   development, etc.) is 0.09 km.
32 The number of subscribers that can be served by one unit of the DTE (the number of subscriber ports, the number of subscribers that make up the maximum
   number of simultaneous connections, etc.) is 48.00 people.
33 Number of floors covered by a single unit of the Ltd. 16.00 floors
34 The number of OODs that can be connected to one LLPA 48 units.
35 The maximum length of the communication channel for the distribution segment is 0.09 km.
36 The maximum length of the communication channel without the use of intermediate LDSM is 40 km.
37 The cost of one unit of OOD is 470 USD.
38 The cost of one unit of LLPD distribution segment 470 USD
39 The cost of one unit of LLPD intermediate assignment is 30.00 USD.
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The cost of special equipment switching node 1384.62 USD
Coverage radius reduction ratio due to building up (from 0.01 to 1) 1.00
The coefficient of aggregation of lines to the cable for external lines 1.00
The coefficient of aggregation of lines to the cable for internal lines (from 0.01 to 1) 0.33
The coefficient of aggregation of lines to the cable for external lines of the distribution segment (from 0.01 to 1) 0.333333333333333
The coefficient of aggregation of lines in the cable for external lines of the aggregate segment (from 0.01 to 1) 0.02
The maximum length of the communication channel for the aggregate segment is 40 km.
The cost of materials for the arrangement of a single location Ltd. 50.00 USD
The cost of materials for the arrangement of a single distribution distribution site LDSD 50.00 USD
The cost of materials for the arrangement of one place of renewable distribution LLPD 50 cu
The cost of the cable is AL 346.15 cu / km.
The cost of the distribution segment cable is 346.15 USD / km.
The cost of the cable aggregate segment 2653.84615384615 cu / km.
The cost of internal sewage materials is 211.54 USD / km.
The cost of outdoor sewage materials is 5850 USD / km.
The cost of a license for the use of HRD per one object is 0 USD
The cost of installation work on the arrangement of space for equipment 7.50 USD / hour
The cost of installation and configuration of equipment is 15.00 USD / hour
The cost of construction of sewage systems 7.5 USD / hour
The cost of construction of in-house sewage 3.75 USD / hour
The cost of installation of subscriber lines 5.63 USD / hour
The cost of the suspension of the cable 4.6875 USD / hour
The cost of cable laying in sewage 5.625 USD / hour
Standard labor costs for the arrangement of a place under LLP 6.00 people * hour
Standard labor costs for the arrangement of space for the Ltd. 6.00 man * hour
Standard labor costs for the installation of equipment 8.00 man * hour
The standard labor costs for the construction of the sewage system is 280.00 person * hour / km.
Standard labor costs for the construction of cable sewage 400 people * hour / km.
The standard labor costs for the cable in the sewer 20 people * hour / km.
Standard labor costs for hanging the cable 40 people * hour / km.
The percentage of standard design costs 5.00%
The volume of annual consumption of power supply by one unit of KLA is 350.40 kW * hour
The volume of annual consumption of power supply by one unit of LLP is 350.40 kW * hour
The cost of equipment operation is 13.5 USD / hour
Cost of cable infrastructure maintenance 7.5 USD / hour
Standard annual labor costs for servicing one meter of suspended cables 2 hours / km.
The norms of annual labor costs for servicing one meter of cable in the sewage system are 4 hours / km.
The standard of annual labor costs per meter of intrahouse subscriber lines is 0.05 hour / km.
The standard of annual labor costs per unit of active equipment is 16.00 hour / unit.
The standard labor costs for the construction of subscriber lines 280 people * hour / km.
The level of penetration of access networks 2 (1: Access networks are missing; 2: Access networks are not developed very well; 3: Access networks are
developed significantly)
Percentage of population covered by broadband access 20%
Percentage of the population of the younger age group (under 25 years) who are interested in services 50%
Percentage of the population of the middle age group (from 25 to 55 years old) who are interested in services 70%
Percentage of the population of the older age group (over 55 years) who are interested in services 50%
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The coefficient of nepotism (the average number of people in the family) 3 people.
Percentage of solvent population of the younger age group (under 25) 50%
Percentage of the solvent population of the middle age group (up to 25 to 55 years old) 40%
Percentage of the solvent population of the older age group (over 55 years old) 50%
Electricity cost 0.1 cu / kW * hour
Discount rate 11%
Income tax rate of 17%
The average lifetime of the equipment is 10 years.
Average monthly revenue per user $ 50
Value Added Tax 20%
The maximum length of intra-house lines is 0.03 km.
Payback period 4 years
Building area: 3 sq. Km
Number of places to accommodate the Ltd., determined by the number of buildings in the built-up part of the object: 13
The number of places to accommodate the Ltd., determined by the building area of the object: 13 units.
The total required number of places to accommodate the OOD: 13 units.
The basic population for calculating the potential subscriber base: 10,000 people.
Base number of solvent population: 2600 people.
Number of potential subscribers: 2600 people.
The number of Ltd. capable of covering the required number of subscribers: 55 units.
The final number of units OOD: 55 units.
Network radius: 0.97720502380584 km.
The radius of the object: 1.7841241161528 km.
Number of places to accommodate a LLP: 1 unit.
The number of distribution ports of LLPD employed for the connection of a single Ltd.: 2 ports
The number of units of the LLP of the recovery segment for connecting the LLDD of the distribution segment (the part closest to the switching node)
throughout the entire territory of the object: -0 units
The number of units of the LLP of the recovery segment for connecting the LLDD of the distribution segment (the part remote from the switching node)
throughout the entire territory of the object: -0 units.
The base number of units of the LLP restoration segment: 0 units.
The number of LLPD units required to connect a given number of OOD throughout the facility: 13 units.
Number of subscribers in the near zone (up to 30% of the maximum possible distance from the Ltd., 9% of the total): 234 people.
The number of subscribers in the middle zone (from 31% to 60% of the maximum possible distance from the Ltd., 27% of the total): 702 people.
The number of subscribers in the far zone (over 61% of the maximum possible distance from the Ltd., 64% of the total): 1664 people.
Length of subscriber lines within houses (domestic lines): 77.298 km.
Length of subscriber lines outside the houses (external lines): 116.688 km.
Length of the aggregated cables for internal lines: 25.50834 km.
Length of the aggregated cables for external lines: 116.688 km.
The length of the domestic sewage system, which must be built to lay subscriber lines: 12.75417 km.
The length of the external cable ducts, which must be built for laying subscriber lines: 0 km.
The length of subscriber lines outside the houses (external lines) to be laid in the sewer: 116.688 km.
Length of suspended subscriber line cables: 0 km.
The length of the outer connecting lines of the distribution segment: 10.531338541556 km.
The length of the aggregated cables connecting distribution lines of the segment: 3.5104461805185 km.
Cable lengths of connecting lines of the distribution segment in cable ducts: 3.5104461805185 km.
The length of the suspended cables connecting distribution lines of the segment: 0 km.
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The length of the external cable ducts, which must be built for laying the connecting lines of the distribution segment: 0 km.
The length of the outer connecting lines of the aggregate segment: 0.81010296473504 km.
The length of the aggregated cables connecting lines aggregate segment: 0.016202059294701 km.
The length of the connecting lines of the aggregate segment in cable ducts: 0.016202059294701 km.
The length of the suspended cables connecting lines aggregate segment: 0 km.
The length of the external cable ducts, which must be built for laying the connecting lines of the aggregate segment: 0 km.
The length of the outer connecting lines of the connecting and aggregative segments: 11.341441506291 km.
The length of the aggregated cables connecting lines and connecting segments: 3.5266482398132 km.
Cable lengths of connecting lines of connecting and aggregative segments in cable ducts: 3.5266482398132 km.
The length of the suspended cables connecting lines connecting and aggregative segments: 0 km.
The length of the external cable ducts, which must be built for laying the connecting lines of connecting and aggregate segments: 0 km.
The cost of OOD (total): 25850 u.
The cost of the distribution LLP (total): 6110 U.
The cost of LLPD recovery segment (total): 0 U.
The total cost of equipment: 33344.62 u.
The cost of materials for arranging the locations of the Ltd.: 650 U.
The cost of materials for arranging the distribution sites of the LDS: 650 U.
The cost of materials for arranging the LDPE sites of the recovery segment: 0 U.
The total cost of materials for arranging equipment places: 1300 U.
The cost of the cable for laying subscriber lines: 67148.2539 u.
Cable cost for the organization of a distribution segment: 1215.1409453865 f.ed.
The cost of the cable for the organization of the aggregation segment: 42.997772743629 u.
The cost of materials for the construction of cable channels in homes (for laying subscriber lines): 2698.0171218 U.ed.
The cost of materials for the construction of external sewage (for laying lines of all types): 0 U.
The total cost of materials: 72404.40973993 u.
The total cost of materials and equipment: 105749.02973993 w.ed.
Effort on arranging places for Ltd.: 330 people * hour
The cost of installation work on the arrangement of places under the Ltd.: 2475 U.
Work on the arrangement of places for distribution LLP: 78 people * hour
The cost of installation work on the arrangement of places for distribution LLP: 585 U.
Work on the arrangement of places for a limited liability company for the recovery segment: 0 people * hour
The cost of installation work on the arrangement of places under the limited liability partnership of the recovery segment: 0 U.
Total labor costs for arranging places for placement of active and passive equipment: 408 people * hour
The total cost of installation work on the arrangement of places for the placement of active and passive equipment: 3060 U.
Labor costs for the installation and configuration of the Ltd: 440 people * hour
The cost of the installation and configuration of the Ltd.: 6600 u.
Effort on installation and adjustment of distribution LLPD: 104 people * hour
The cost of the installation and configuration of the distribution LLP: 1560 U.
Man-hours for installation and configuration of a recovery-segment LLPD: 0 man * hour
The cost of the installation and configuration of the LDS of the recovery segment: 0 U.
Total labor costs for installation and configuration of active and passive equipment: 544 people * hour
The total cost of the installation and configuration of active and passive equipment: 8160 U.
Labor costs for installation of cable sewage inside buildings: 3571.1676 people * hour
The cost of installation of cable sewage inside buildings: 13391.8785 U.
Labor costs for installation of subscriber lines inside buildings: 21,643.44 people * hour
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«BroadBand Calculator» Software (https://broadbandcalculator.online)

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The cost of the construction of external lines in cable ducts: 13524.147926979 U.
Total labor costs for the construction of sewage and installation of cable infrastructure: 27618.900564796 people * hour
The total cost of construction of sewage and installation of cable infrastructure: 148768.59362698 U.
The cost of licensing radio frequency resource: 0 U.
Design cost: 7999.4296813489 u.
Total work on the project: 28570.900564796 people * hour
The total cost of construction: 167988.02330833 U.
The total labor costs of servicing all the Ltd.s: 880 people * hour
The total energy consumption of all Ltd.: 19272 kW * hour
The total cost of operation of all Ltd.: 13807.2 u.
The total labor costs for the maintenance of all LEND: 208 people * hour
The total energy consumption of all LLP: 4555.2 kW * hour
The total cost of operation of all LLP: 3263.52 u.
The cost of operating all active and passive equipment: 17070.72 u.
Total labor costs for servicing subscriber lines inside buildings: 3.8649 people * hour
The total cost of servicing subscriber lines inside buildings: 28.98675 U.
Total labor costs for the maintenance of suspended lines: 0 man * hour
The total cost of maintenance of suspended lines: 28.98675 U.
Total labor costs of servicing external lines in the sewage system: 0 man * hour
The total cost of servicing external lines in the sewer: 3606.4394471944 U.
The cost of servicing all communication lines: 3635.4261971944 U.
The cost of annual network operation: 20706.146197194 U.
Total investment costs: 273737.05304826 USD
Net annual income: 1248000 w.ed.
Net profit: 1018653.8986563 w.ed.
Annual cash flow: 1029228.8016303 w.ed.
Net present value (Net present value, NPV) for 4 years: 2919390 USD
Investment Profitability Index (PI): 11.664942752508
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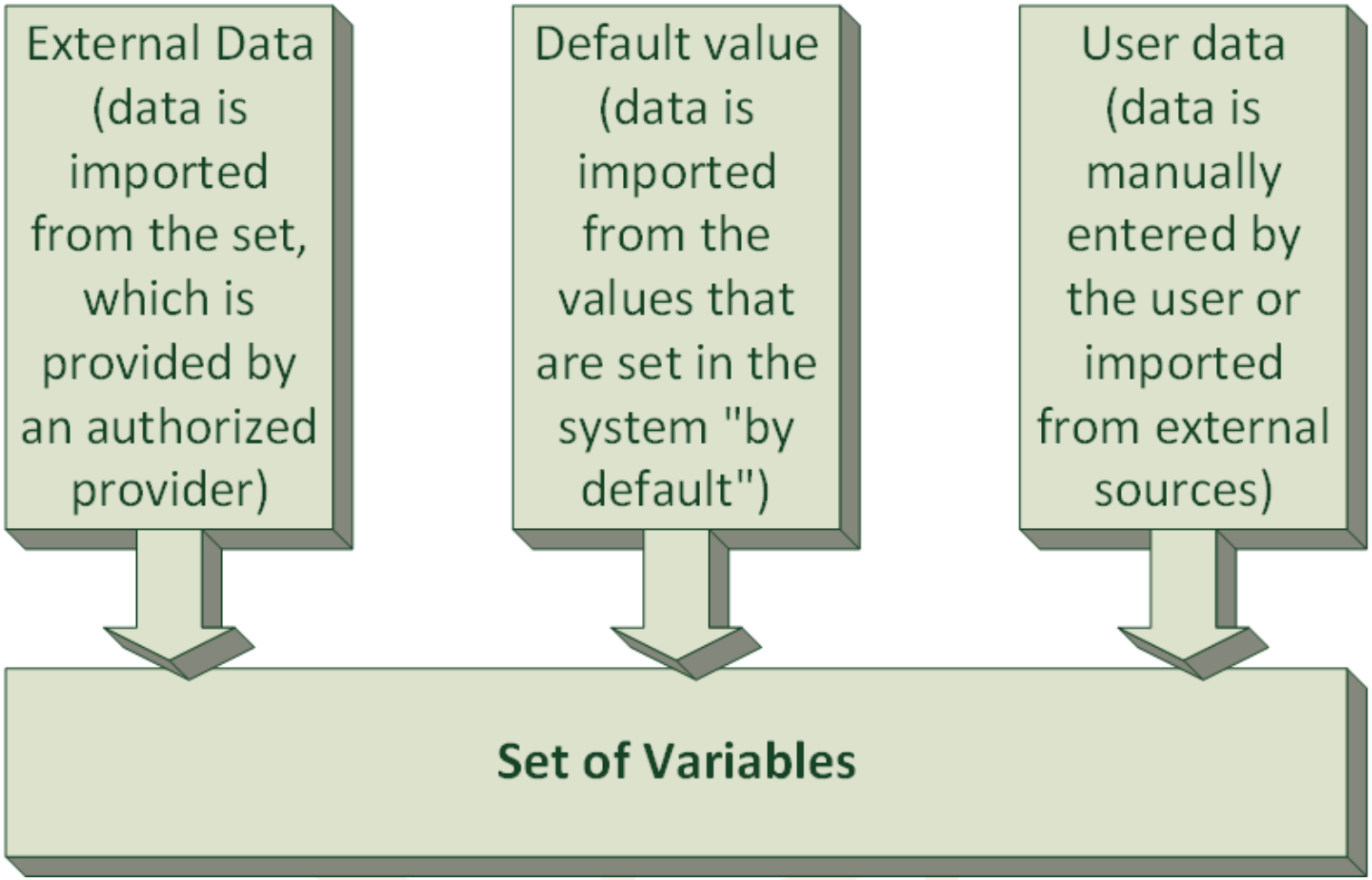
Ways of inputting information necessary for simulation modelling

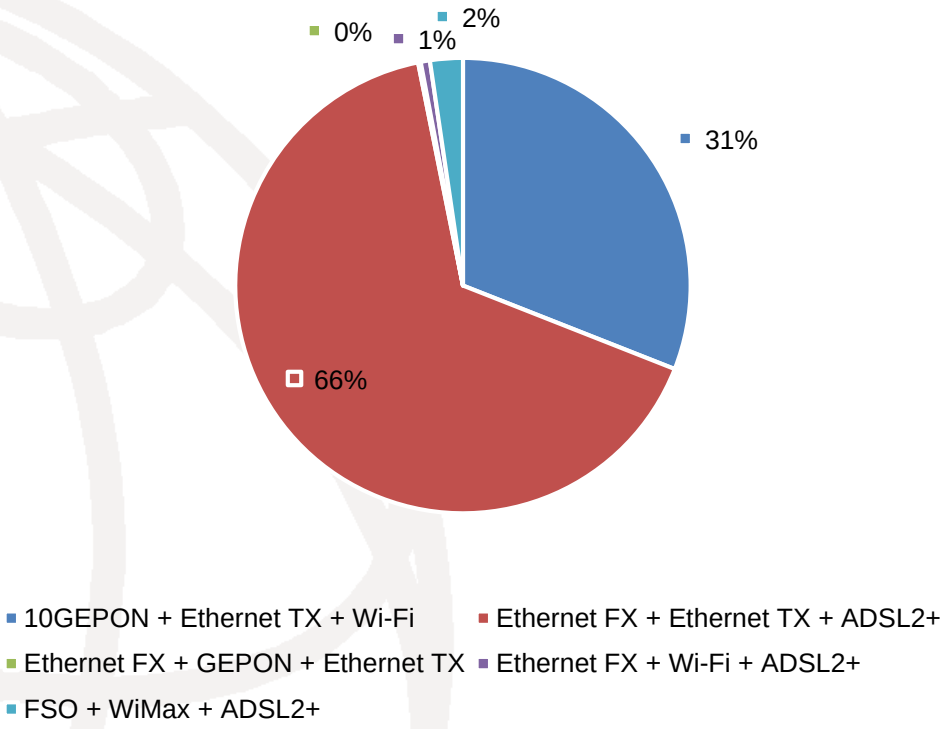


Calculation results. Tajikistan

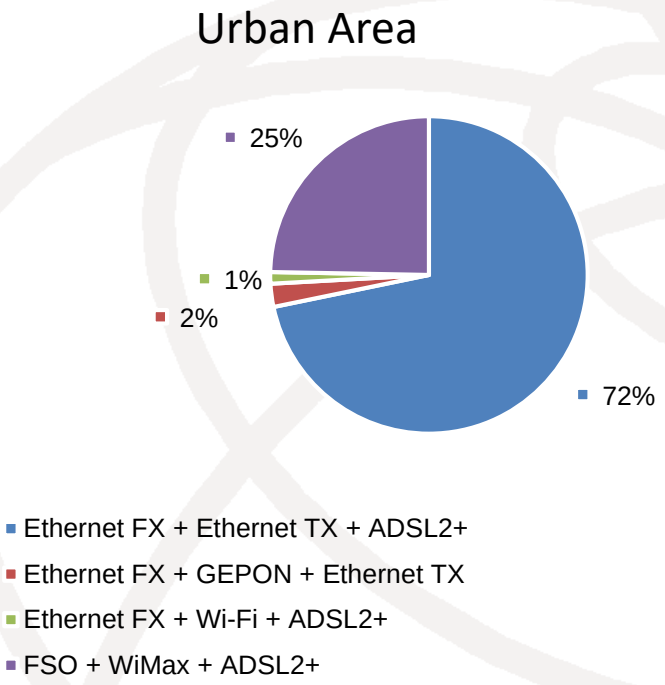
Names and coordinates of the settlement	Recommended technology	NPV, $.
Dushanbe:Dushanbe[38.5763119,68.7860218]	FSO + WiMax + ADSL2+	354159000
Khatlon:Kulob[37.9058363,69.7792851]	FSO + WiMax + ADSL2+	297513000
Viloyati Sughd:Khujand[40.2828032,69.6389657]	FSO + WiMax + ADSL2+	241135000
Viloyati Sughd:Istarawshan[39.9081222,68.9957531]	FSO + WiMax + ADSL2+	148751000
Khatlon:Qurghonteppa[37.8357217,68.7820957]	Ethernet FX + GEPON + Ethernet TX	46345000
Viloyati Sughd:Konibodom[40.2960588,70.4345177]	FSO + WiMax + ADSL2+	31746100
Viloyati Sughd:Isfara[40.1258182,70.6245139]	FSO + WiMax + ADSL2+	27931300
Republican Subordination:Tursunzoda[38.5128361,68.2347524]	FSO + WiMax + ADSL2+	24450500
Viloyati Sughd:Panjakent[39.4961693,67.6141456]	FSO + WiMax + ADSL2+	22202000
Republican Subordination:Hisor[38.5253544,68.5525681]	Ethernet FX + GEPON + Ethernet TX	15369100
Khatlon:Nurak[38.3896911,69.3081146]	FSO + WiMax + ADSL2+	14741000
Republican Subordination:Ābigarm[38.7182807,69.7134525]	FSO + WiMax + ADSL2+	14642400
Gorno-Badakhshan:Shuvjev[37.4222316,71.6032347]	Ethernet FX + Ethernet TX + ADSL2+	5053
Gorno-Badakhshan:Ravgada[38.532615,71.716337]	Ethernet FX + Ethernet TX + ADSL2+	5052
Gorno-Badakhshan:Dursher[38.58219,71.7939245]	Ethernet FX + Ethernet TX + ADSL2+	5052
Gorno-Badakhshan:Pastkhuf[37.8608745,71.5992784]	Ethernet FX + Ethernet TX + ADSL2+	5051
Gorno-Badakhshan:Jovid[38.4665856,71.6234468]	Ethernet FX + Ethernet TX + ADSL2+	5050
Gorno-Badakhshan:Roshorv[38.318827,72.3214731]	Ethernet FX + Ethernet TX + ADSL2+	5047
Gorno-Badakhshan:Rukhch[38.3645478,72.5028096]	Ethernet FX + Ethernet TX + ADSL2+	5044
Gorno-Badakhshan:Vishkharvak[38.5645201,71.7758746]	Ethernet FX + Ethernet TX + ADSL2+	5042

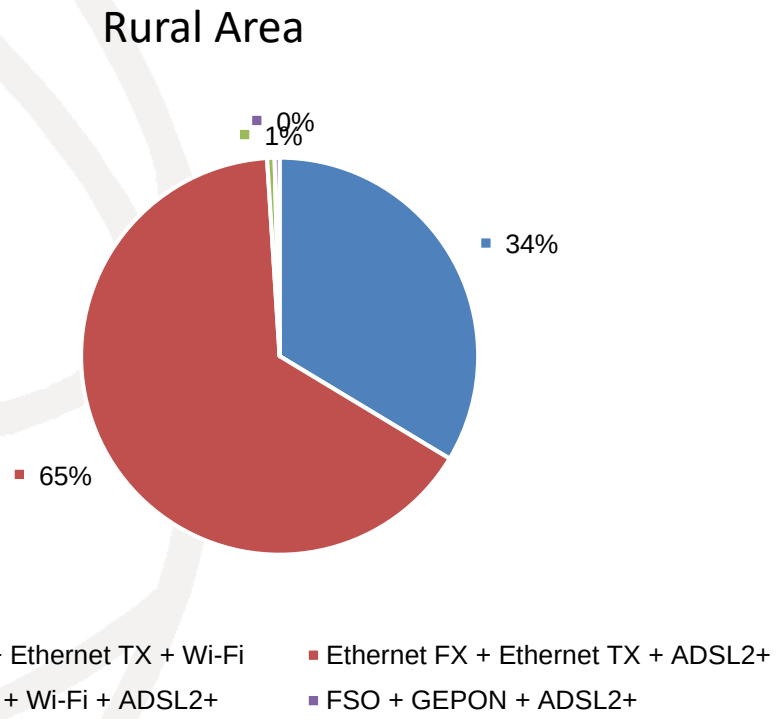
Calculation results. Tajikistan

Characteristic Name	Characteristic Value
Total number of settlements	1075
Number of settlements with a positive NPV (investment-attractive)	1075
Number of settlements with negative NPV (not attractive for investments)	0



Calculation results. Tajikistan





THANK YOU FOR ATTENTION