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

Vadym Kaptur

Ph.D., Senior Researcher
Vice-Rector on Scientific work O.S. Popov ONAT
Vice-Chairman of CWG on COP
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)

Using a simplified hierarchy analysis method to compare network design options

(Approach - Expert assessment taking into account the existing situation)

SELECTION OF PROMISING TECHNOLOGIES BASED ON COMPARATIVE ANALYSIS

The method is based on a simplified version of the hierarchy analysis method and **lies in** determining the weighted indicator of each technology on the basis of scores of the list of operational and technical criteria and their weight coefficients obtained by their pairwise comparison

Feature of the method: in the process of the analysis there is a mutual discussion on each criterion by a group of experts, as a result of which a rational combination of expert opinions is provided and, finally, the generalized evaluation of each criterion of the compared technologies is accepted

UNIFORM COMPREHENSIVE COMPARATIVE EVALUATION

To determine a single complex comparative evaluation of the technologies under consideration, the expression:

$$Q = \sum_{i=1}^{n} K_i B_i$$

is used, where

K – weight coefficient of ***i***-th criterion

B – scoring of ***i***-th criterion

COMPARISON CRITERIA
(based on the example of access technologies)

The comparison criteria are chosen basing on the main functional differences between the technologies

Examples of criteria:

1) Throughput capacity of the channel
2) Maximum distance to the subscriber
3) Reservation Support
4) Efficiency of subscriber actions management
5) Availability of equipment
6) Accessibility of specialists
7) Popularity of technology
8) Level of standardization
9) Compatibility with the transmission medium
10) Compatibility of equipment from different manufacturers

EXAMPLE OF CRITERIA COMPARISON

Matrix of comparison

	1	2	3	4	5	6	7	8	9	10
1	1	1	2	2	2	1	2	2	2	1
2	1	1	2	2	2	1	2	2	2	1
3	0	0	1	2	1	0	2	1	1	0
4	0	0	0	1	0	0	1	0	0	0
5	0	0	1	2	1	0	2	1	1	0
6	1	1	2	2	2	1	2	2	2	1
7	0	0	0	1	0	0	1	0	0	0
8	0	0	1	2	1	0	2	1	1	0
9	0	0	1	2	1	0	2	1	1	0
10	1	1	2	2	2	1	2	2	2	1

EXAMPLE OF THE POINT SCORINGS OF SELECTED CRITERIA

A fragment of the score table

№	Criterion	Technologies of the access networks construction								
		1	2	3	4	5	6	7	8	9
1	Bandwidth of the communication channel (from 1 to 10 points)	5	1	1	10	10	7	2	1	10
2	Maximum length of the segment (from 1 to 10 points)	9	2	1	1	1	2	2	10	10

1 - DOCSIS, 2 - ADSL, 3 - SHDSL,
4 - Ethernet, 5 - Wi-Fi, 6 - Wi-Max,
7 - ADSL2+, 8 - CDMA, 9 - LongTermEvolution (LTE)

UNIFORM COMPREHENSIVE COMPARATIVE EVALUATION (EXAMPLE)

(*i*)	Critetion	K_i	Score								
			1	2	3	4	5	6	7	8	9
1	Bandwidth of the communication channel	0,16	5	1	1	10	10	7	2	1	10
2	Maximum distance to the subscriber	0,16	9	2	1	1	1	2	2	10	10
…											
7	Popularity of technology	0,02	5	10	10	10	10	2	10	3	1
…											
Q			**5,32**	**5,66**	**6,4**	**8,24**	**7,68**	**4,8**	**6,72**	**4,9**	**4,86**

Leaders:

4 - **Ethernet** ***Q*=8,24**
5 - **Wi-Fi** ***Q*=7,68**
7 - **ADSL2+** ***Q*=6,72**

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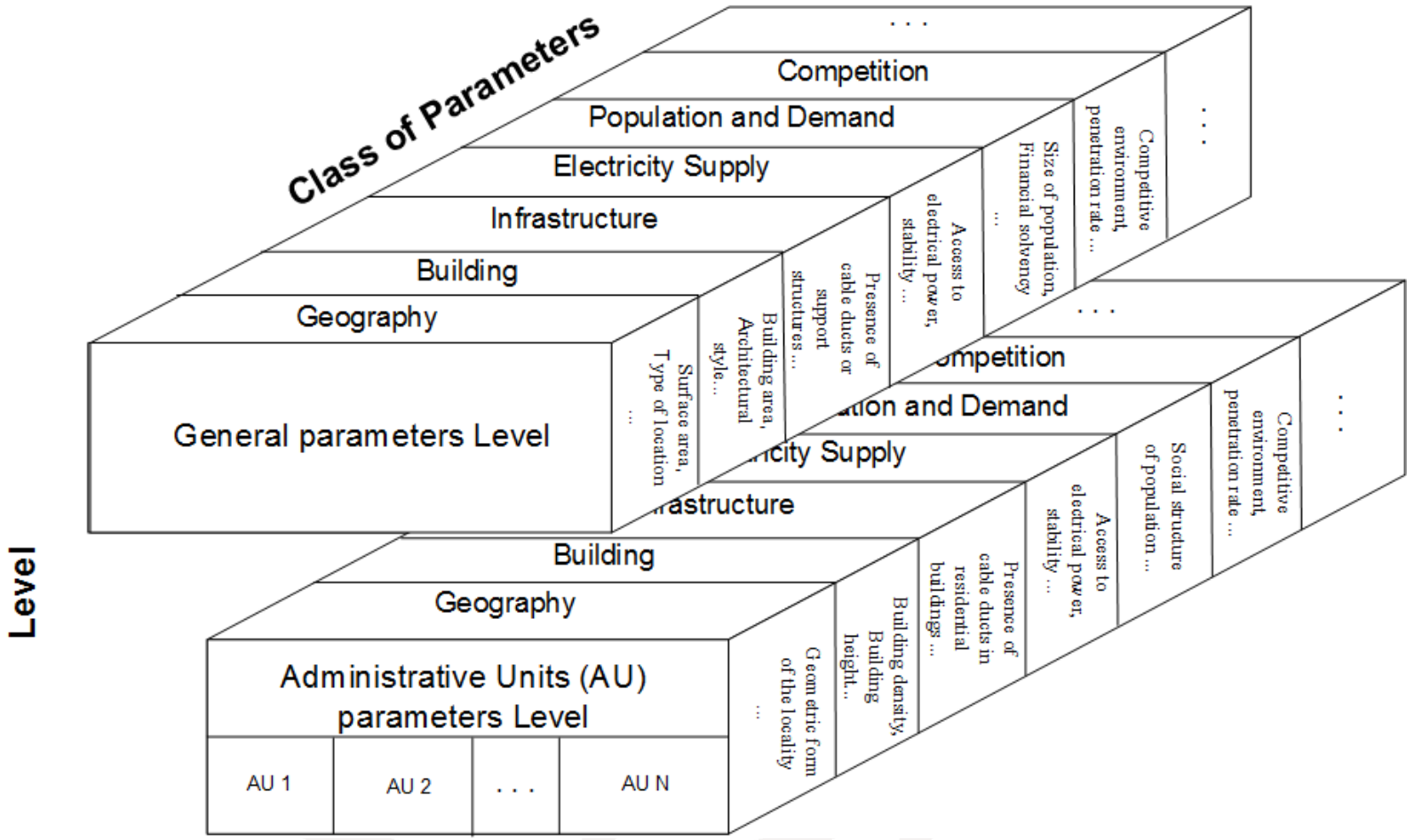
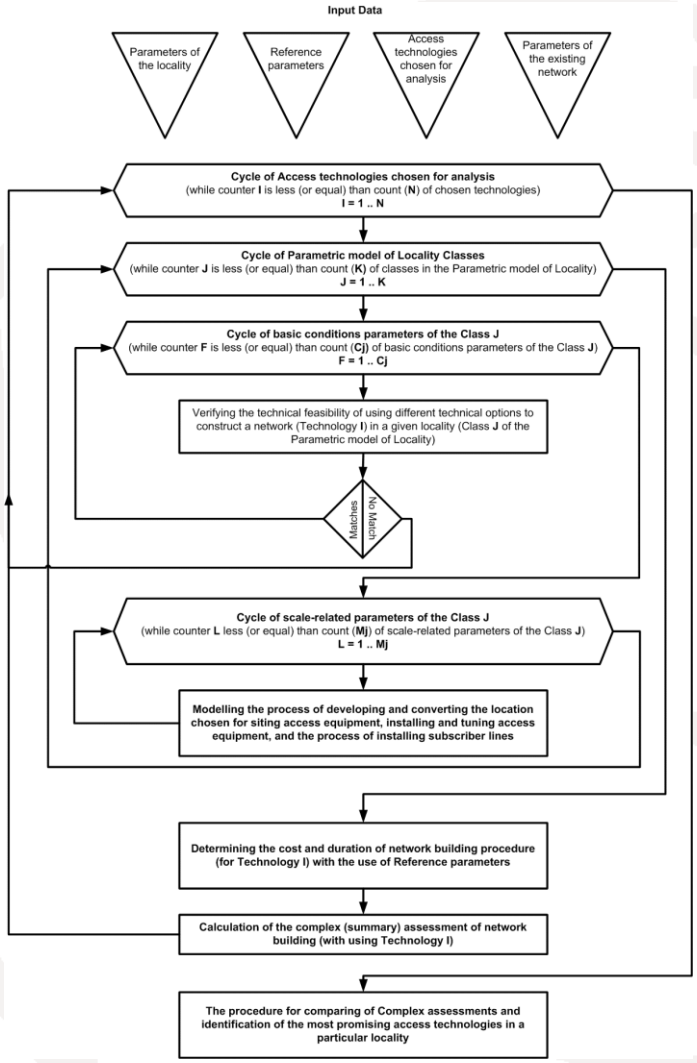
Selection of technological solutions for building telecommunications networks (Approach - Simulation modeling with the purpose of economic feasibility assessment)

Generalized model of a typical settlement



Basic 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»

Determination of the number of active equipment and places for its installation

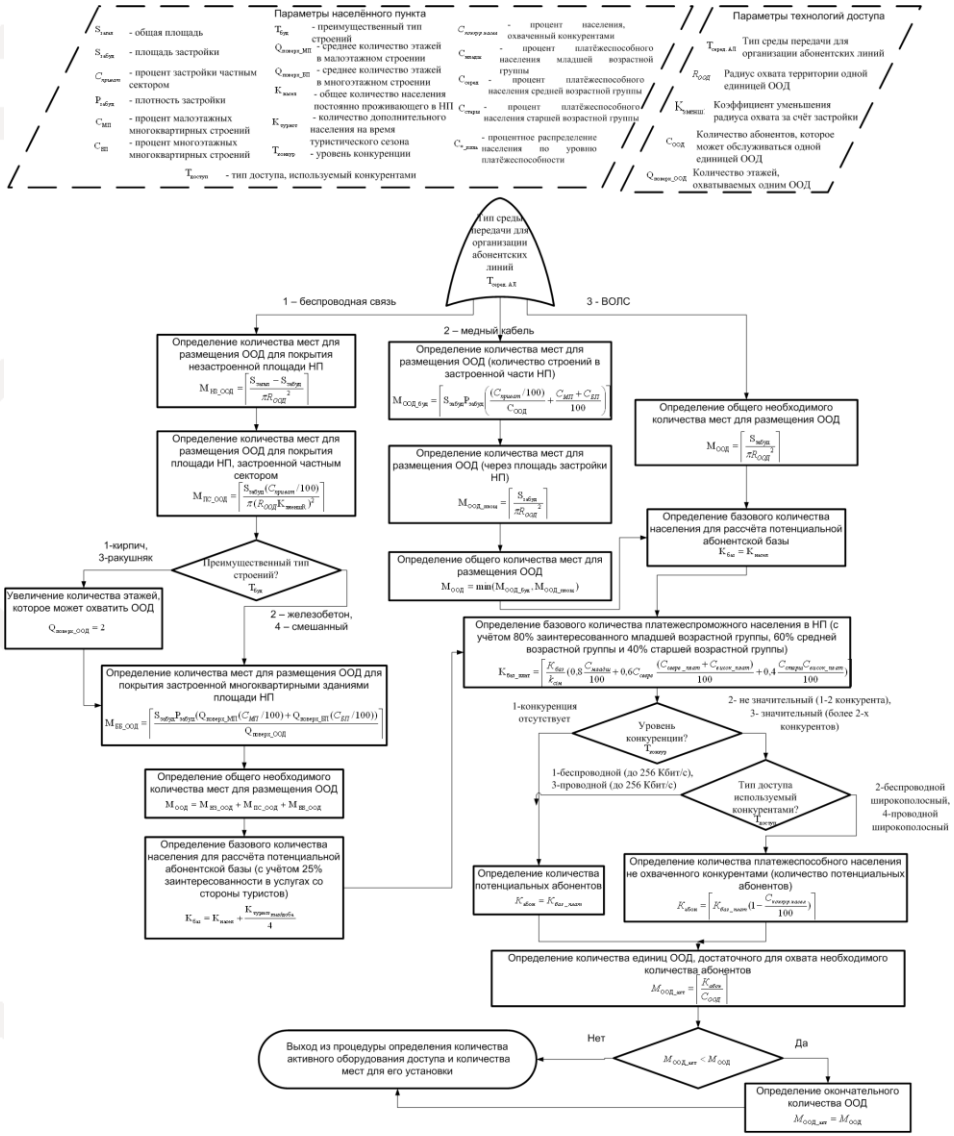


Рисунок 4.3 – Алгоритм визначення кількості активного обладнання доступу та кількості місць для його встановлення

THANK YOU FOR ATTENTION