# SOME CARDINAL AND TOPOLOGICAL PROPERTIES OF COMPLETE LINKED SYSTEMS

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A.V. Ivanov defined the space $NX$ of complete linked systems (CLS) of a space $X$ in a following way:

**Definition 1.** [1]. A linked system $M$ of closed subsets of a compact $X$ is called *a complete linked system* (a CLS) if for any closed set of $X$, the condition

"Any neighborhood $OF$ of the set $F$ consists of a set $\Phi \in M$"

implies $F \in M$.

Obviously, any MLS $\xi$ is a CLS, hence, $\lambda X \subset NX$.

**Definition 2** [2]. Let $M$ be a complete linked system of a compact $X$. The CLS $M$ will be said *a thin complete linked system* if $M$ contains at least one finite element.

We denote a thin complete linked system $M$ by a TCLS.

**Definition 3** [2]. We call *an N-thin kernel* of a topological space $X$ the space

$$N^*X = \{M \in NX : \ M \ \text{ is a TCLS}\}.$$

**Theorem 1.** *Let $X$ be a topological $T_1$-space. Then*:

1) $\pi w(N^*X) = \pi w(N_{cm}X) = \pi w(N_cX) = \pi w(X)$;

2) $d(X) = d(N^*X) = d(N_{cm}X)$;

3) $n\pi w(N^*X) = n\pi w(N_{cm}X) = n\pi w(X)$;

4) *If $X$ is an infinite Tychonoff space, then*

$$wd(N^*X) = wd(N_cX) = wd(N_{cm}X) = wd(NX) \leq wd(X).$$

**Definition 4** [3]. Let $P$ be a family of subsets of a space $X$ and $\tau(X)$ is the topology on $X$. $P$ is called a $k$ - network if whenever $K$ is a compact subset of $X$ and $K \subset U \in \tau(X)$, there is a finite subfamily $P' \subset P$ such that $K \subset \bigcup P' \subset U$.

**Theorem 2.** Suppose that topological space $X$ have $k$-network of cardinality $\tau \geq \aleph_0$, then the space $N^*X$ has a $k$-network of cardinality $\geq \tau$.

**Theorem 3.** Suppose that topological space $X$ have $k$-network of cardinality $\tau \geq \aleph_0$, then the space $N_cX$ has a $k$-network of cardinality $\geq \tau$.

**Theorem 4.** Suppose that topological space $X$ have $k$-network of cardinality $\tau \geq \aleph_0$, then the space $N_{cm}X$ has a $k$-network of cardinality $\geq \tau$.

## Reference

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[2]. Makhmud T., Cardinal-valued invariants of spaces of linked systems. Candidate thesis in physics and mathematics. Moscow State University, Moscow. 1993.

[3]. Li Zhaowen, Lin Fucai, Liu Chuan., Asymptotical method. *Networks on free topological groups.*, Topology and its Applications, vol. 180, (2015) p. 180-198.