Refutation of surveillance objectives

Abstract: We evaluate an equivalence and theorem. Neither are tautologous. Hence the reduction of the multi-agent surveillance synthesis problem to solving single-sensor surveillance subgames is refuted. What follows is that surveillance objectives are *non* tautologous fragments of the universal logic VŁ4.

We assume the method and apparatus of Meth8/VŁ4 with `T`autology as the designated proof value, **`F`** as contradiction, `N` as truthity (non-contingency), and `C` as falsity (contingency). The 16-valued truth table is row-major and horizontal, or repeating fragments of 128-tables, sometimes with table counts, for more variables. (See ersatz-systems.com.)

LET ~ Not, ¬ ; + Or, ∨, ∪; - Not Or; & And, ∧, ∩, ·; \ Not And;
> Imply, greater than, →, ↦, ≻, ⊃, ⊢, ⊨, ⇾; < Not Imply, less than, ∈, ≺, ⊂, ⊬, ⊭, ↚;
= Equivalent, ≡, :=, ⟺, ↔, ≜, ≈; @ Not Equivalent, ≠;
% possibility, for one or some, ∃, ◊, M; # necessity, for every or all, ∀, □, L;
(z=z) `T` as tautology, ⊤, ordinal 3; (z@z) **`F`** as contradiction, ∅, Null, ⊥, zero;
(%z<#z) `C` as contingency, Δ, ordinal 1; (%z>#z) `N` as non-contingency, ∇, ordinal 2;
~(y < x) (x ≤ y), (x ⊆y); (A=B) (A~B).
Note: For clarity we usually distribute quantifiers on each variable as designated.

From: Bharadwa, S.; Dimitrova, R.; Topcu, U. (2019).
Distributed synthesis of surveillance strategies for mobile sensors.
arxiv.org/pdf/1902.02393.pdf suda.b@utexas.edu

D. Temporal surveillance objectives
In this paper we consider safety and liveness surveillance objectives, as well as conjunctions of such objectives. We remark the following equivalences of surveillance objectives: ...

if $a \leq b$, then $\Box p_a \wedge \Box\Diamond p_b \equiv \Box p_a$ (D.1.1)

LET p, q, r, s: p, q, a, b

~(s<r)>(((#p&q)&(#%p&s))=(#p&r)) ; `TTTT TCTC TTTT TCTC` (D.1.2)

Using these equivalences, we can restrict our attention to surveillance objectives of one the following forms:

$\Box p_b$, [or] $\Box\Diamond p_b$[,] or $\Box p_a \wedge \Box\Diamond p_b$, where $a > b$ (D.2.1)

(r>s)>(((#p&s)+(#%p&s))+((#p&r)&(#p&s))) ;
`FFFF` `TTTT CTCT CTCT` (D.2.2)

Eqs. D.1.2 and D2.2 are *not* tautologous. This means the equivalences of the surveillance objective forms are *not* tautologous. Hence the reduction of the multi-agent surveillance synthesis problem to solving single-sensor surveillance subgames is refuted.