Comparison of AIV and CV

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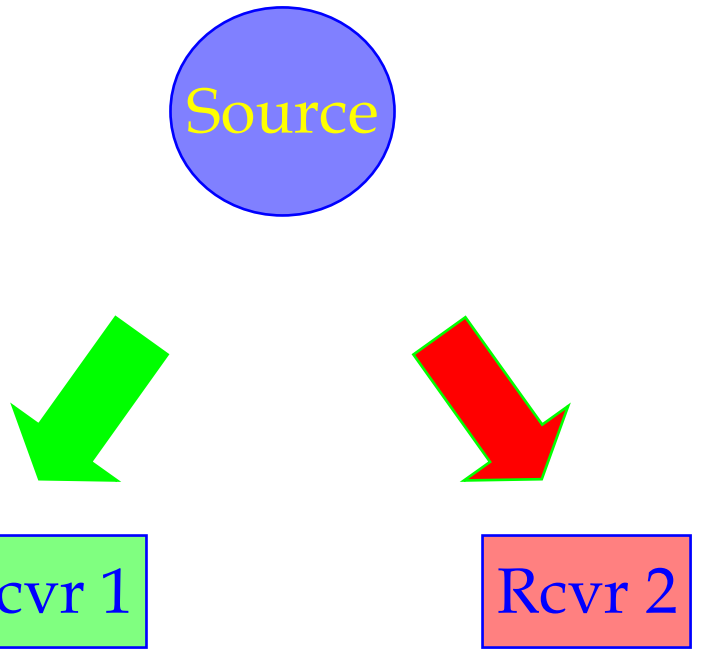
Common-view method

Satellite clock and propagation delay cancels if path delays are nearly equal

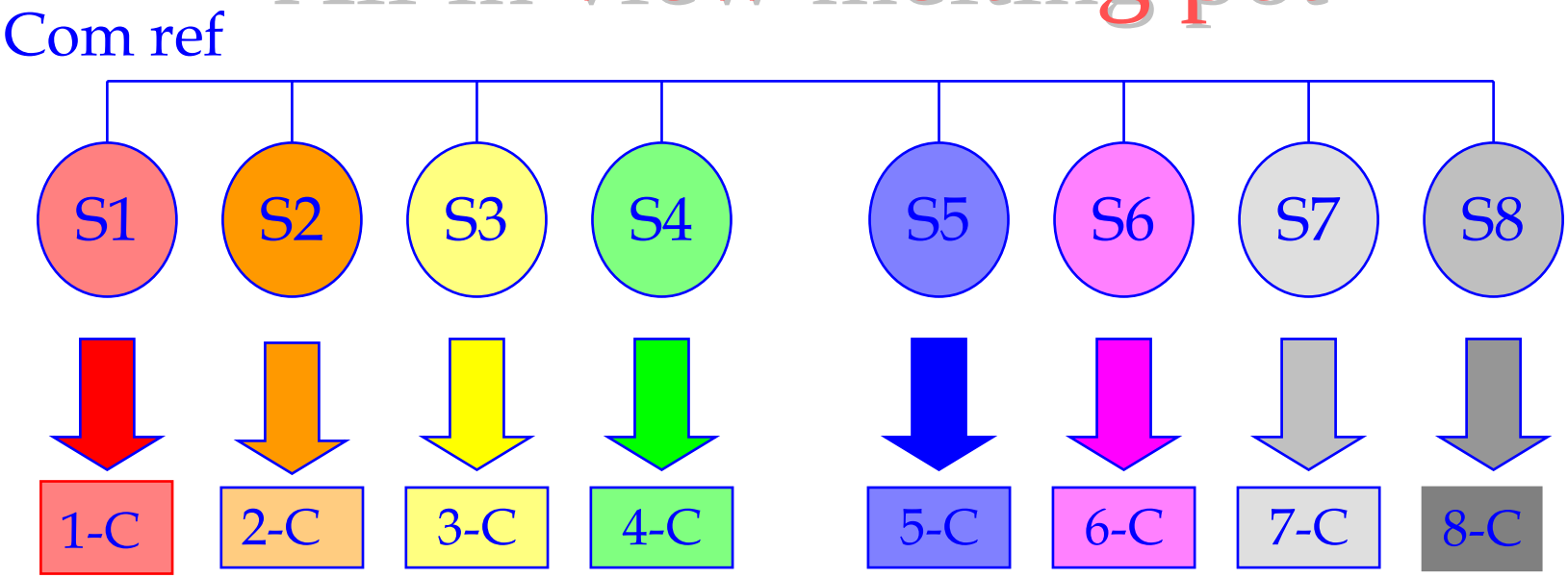


$T1 = t(1) - s$

$T2 = t(2) - s$

$\Delta t = T1 - T2$

All in view melting pot



Rcvr 1

Rcvr 2

$\Delta_1=(S1+S2+S3+S4)/4$

$\Delta_2=(S5+S6+S7+S8)/4$

$\Delta T=\Delta_1-\Delta_2$

Comparison of the methods

- More satellites available in AIV
  - Especially important at longer baselines
- AIV depends on precise ephemerides and clock solutions
  - More difficult for real-time applications
- Difference should be small at shorter baselines

Typical CV – AIV comparison

Lab2-Lab1	Scv	Sav	d		U_b
CRL-PTB	2.108	1.297	0.811		4
NIST-PTB	1.838	2.256	-0.418		5
MSL-CRL	3.538	1.971	1.567	!!	20
NPL-NIST	2.240	2.377	-0.137		5+

$d < U_b$ for all comparisons

(TM132 – Jiang & Petit)

CV-AIV test in Asia

TABLE II

BASELINE COMPARISON BETWEEN COMMON-VIEW AND ALL-IN-VIEW.

link	common-view # obs.	common-view # ave.	common-view R.M.S.	all-in-view # ave.	all-in-view R.M.S.	CV-AIV (ns)
NMIA - KRIS	27,539	10,539	3.986 ns	10,799	2.621 ns	+1.37
NMIA - NICT	30,216	10,881	3.623 ns	11,014	2.467 ns	+1.15
NMIA - TL	33,970	11,034	4.153 ns	11,087	2.735 ns	+1.42
KRIS - NICT	98,482	14,950	1.533 ns	14,486	1.587 ns	-0.05
KRIS - TL	96,080	15,136	1.968 ns	15,029	2.004 ns	-0.04
NICT - TL	110,243	18,419	1.739 ns	18,301	1.807 ns	-0.07
NICT - TL,P3	212,222	35,259	0.926 ns	35,083	0.910 ns	+0.02

(Tadahiro Gotoh, NICT)

U_b ~ 5-6 ns

Summary -- 1

- AIV decreases U_A uncertainty on many (but not all) links
- May be easier to compute and manage the data
- Uncertainty dominated by U_B at almost all laboratories
- Probably not much improvement in long-term stability of TAI

Summary -- 2

- Standard common-view retained for real-time customers of timing laboratories
- Link between different systems (two-way and GPS) will require pivot laboratories