

Modified Tree-ID Process for Long-haul Transmission and Long PHY_DELAY

Takayuki Nyu

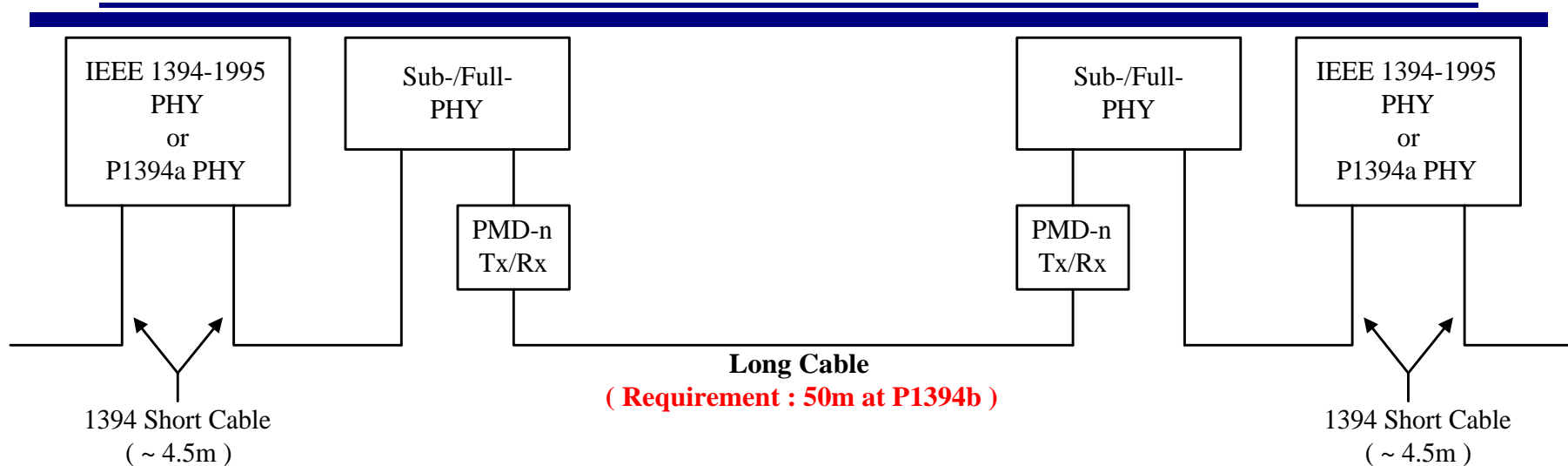
C&C Media Research Laboratories

NEC Corporation

Outline

1. Introduction
2. Review of current root contention resolution
3. Proposal of supplemental root contention resolution
4. Advantage of proposed method
5. Conclusion

Requirement for P1394a PHY



~ Requirement for sub-/full- PHY ~

Compatibility with P1394a and IEEE 1394-1995 PHYs

Use of identical function blocks in P1394a and sub-/full- PHY realizes low cost LSI

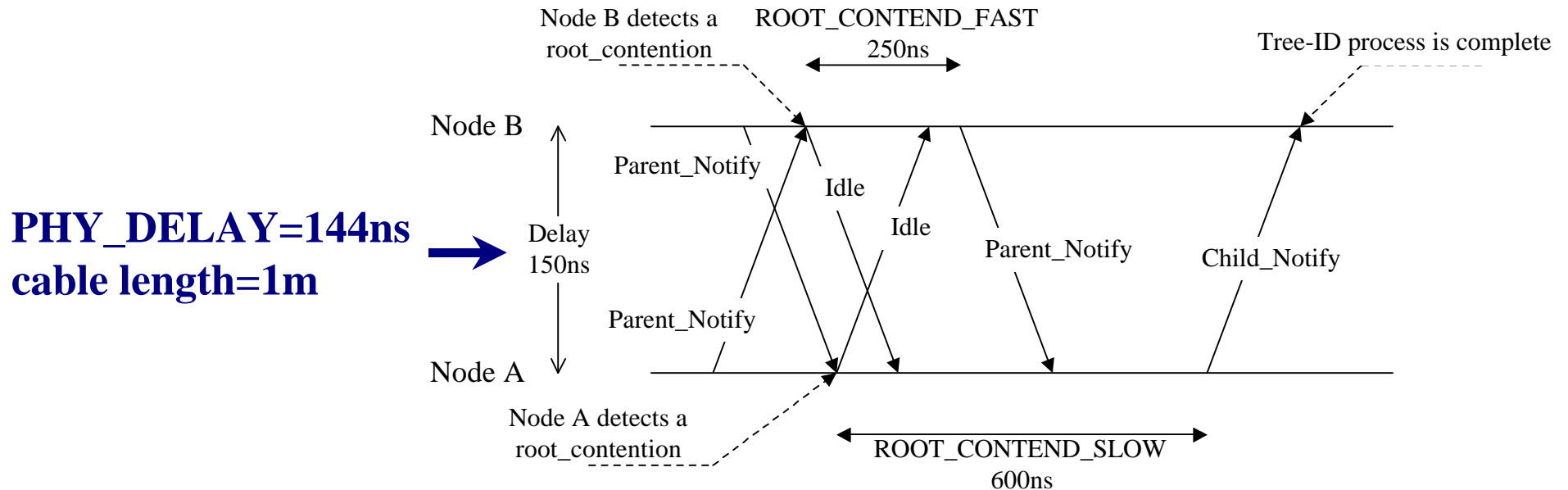
~ Requirement for sub-/full- and P1394a PHY ~

Root Contention Resolution for Long Delay between PHYs

Review of Root Contention in IEEE 1394-1995

~ Resolution Conditions ~

- 1: $\text{ROOT_CONTEND_FAST} > 2 * \text{cable_delay} + \text{phy_delay}$
- 2: $\text{ROOT_CONTEND_SLOW} - \text{ROOT_CONTEND_FAST} > 2 * \text{cable_delay} + \text{phy_delay}$



**The distance between nodes is limited less than 8m
when PHY_DELAY is 144ns**

Review of Contention Timer in P1394a Draft 1.0

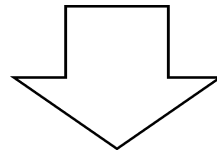
~ Timing constants in Draft 1.0 ~

ROOT_CONTEND_FAST = 760ns ~ 800ns

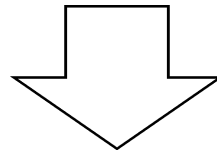
ROOT_CONTEND_SLOW = 1600ns ~ 1640ns

PHY_DELAY = 80ns ~ 144+ (delay*20) ns

delay = 0 ~ 15 (4bit in self-id packet)



**Maximum distance between nodes is approx. 28m
when PHY_DELAY = 444ns**



Requirement of 50m in P1394b is NOT met.

Approach for Long Cable and Long PHY_DELAY

~ Approach 1 ~

The use of a resolution method which is independent both of cable_delay and of PHY_DELAY

~ Approach 2 ~

The use of longer timing constants than constants in Draft 1.0.

i.e. $\text{ROOT_CONTEND_FAST} = 1\mu\text{s} (100/\text{base_rate})$

$\text{ROOT_CONTEND_SLOW} = 2\mu\text{s} (200/\text{base_rate})$

for cable length of 50 m and PHY_DELAY of 444 ns



Extra time is consumed in case that a short cable is used and that PHY_DELAY is small.

Proposal of Supplemental Process

~ *Basic process of proposed method* ~

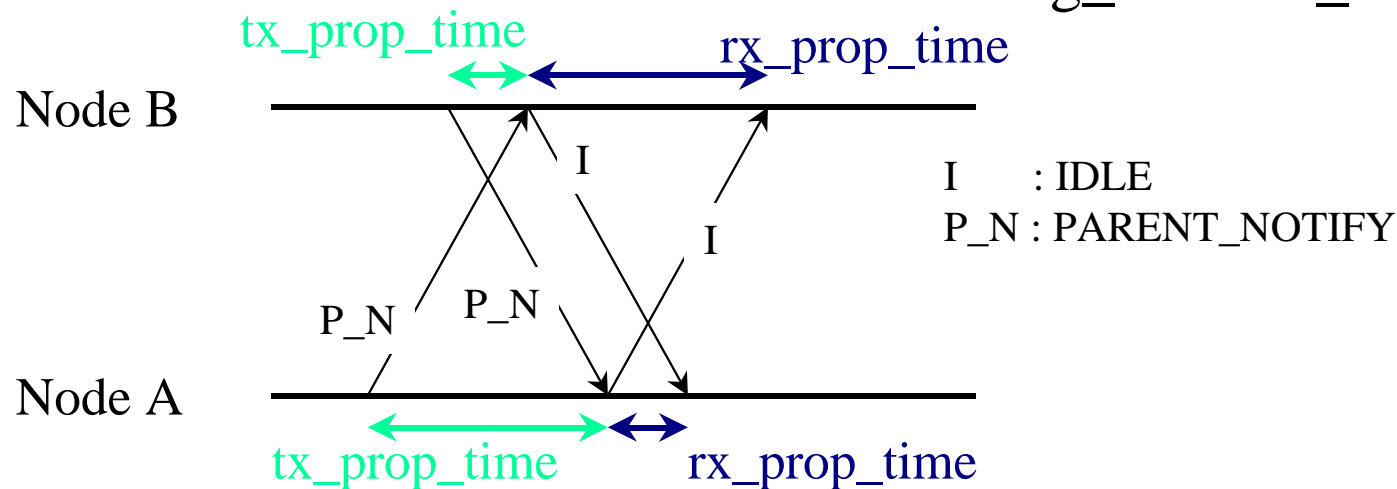
1st : Detect both **tx_prop_time** and **rx_prop_time**.

2nd : Compare **tx_prop_time** to **rx_prop_time**

3rd : $\text{tx_prop_time} < \text{rx_prop_time} \rightarrow$ root node

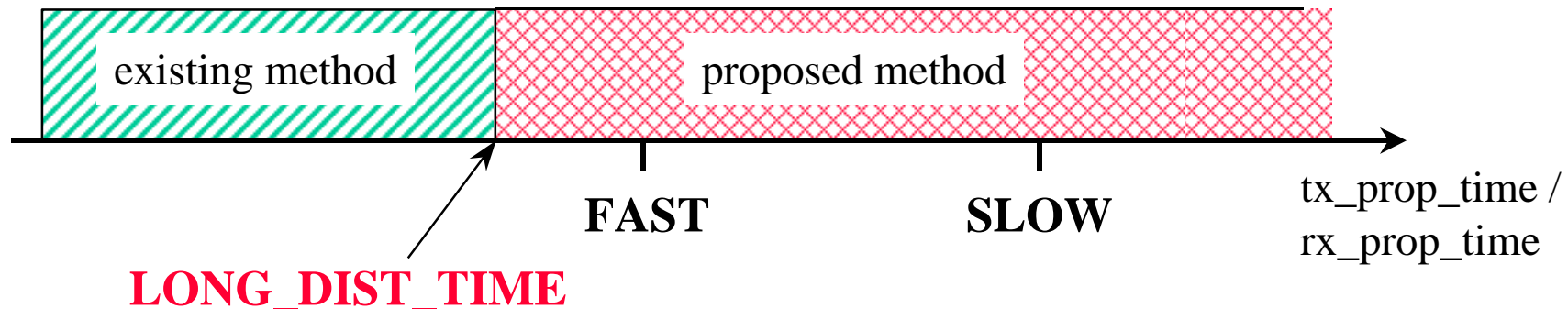
$\text{tx_prop_time} > \text{rx_prop_time} \rightarrow$ child node

$\text{tx_prop_time} = \text{rx_prop_time} \rightarrow$ retransmit PARENT_NOTIFY
after long_contend_time



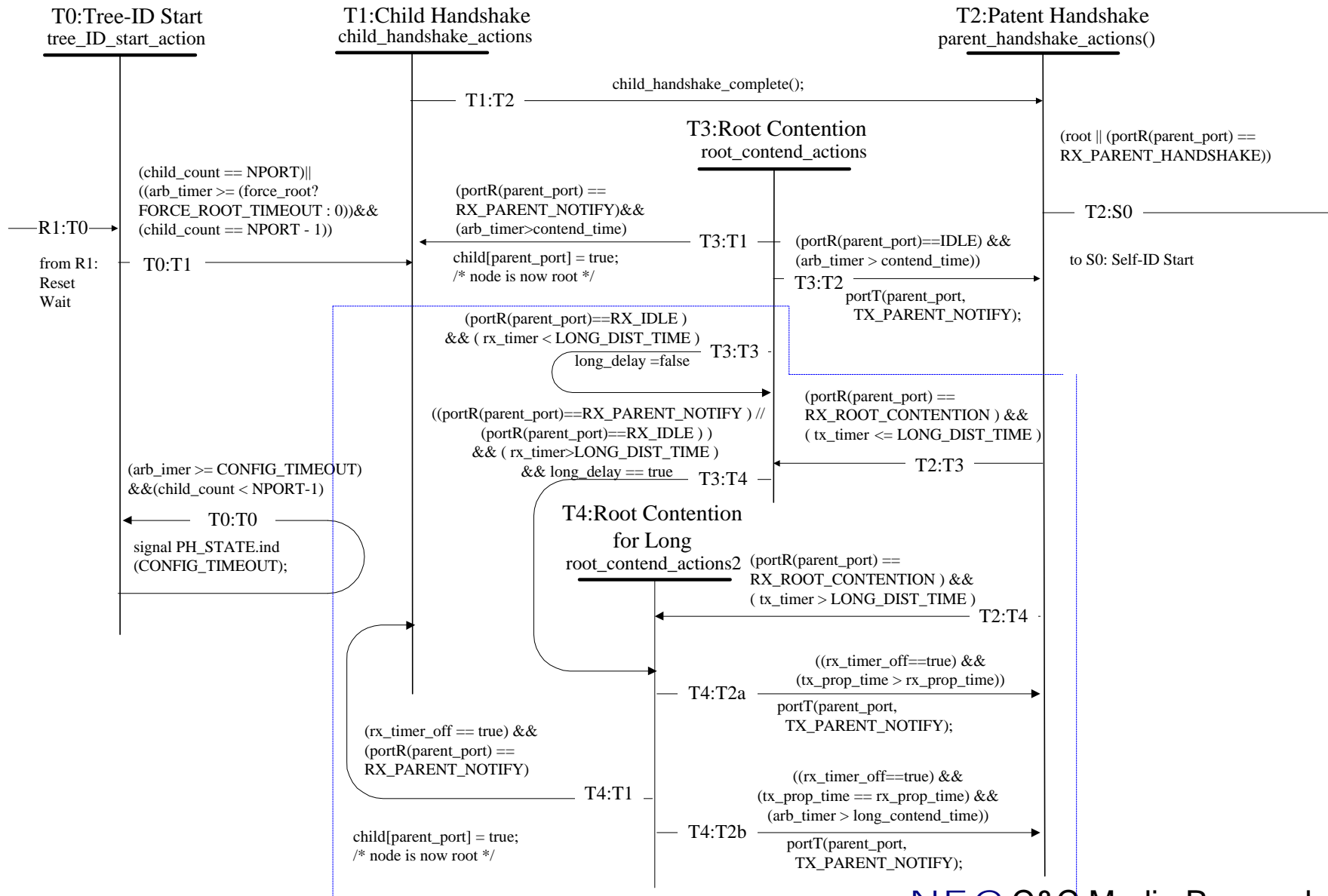
Additional PHY Timing Constant for Switch

LONG_DIST_TIME : Transition timing from existing method to proposed method.

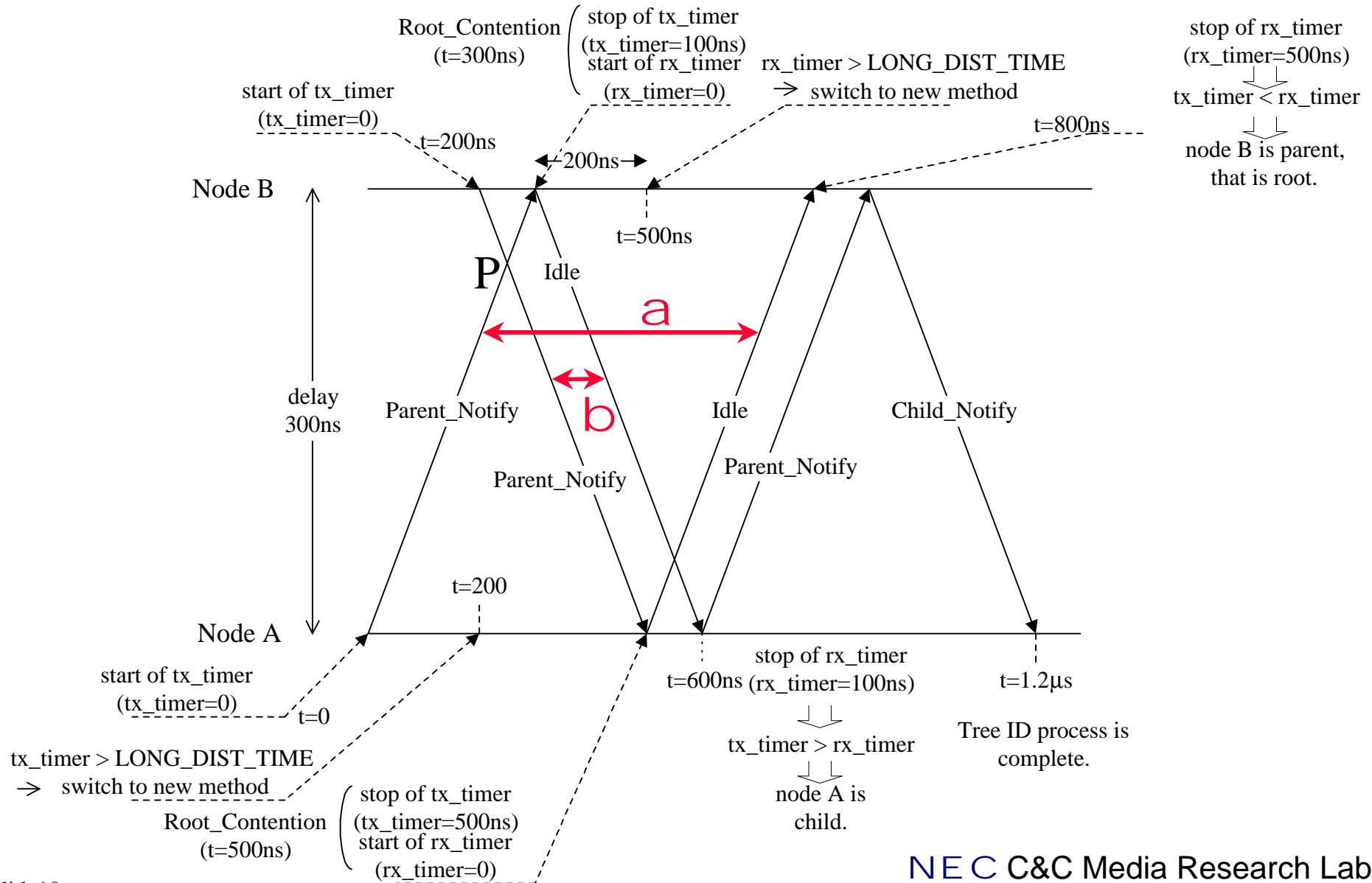


LONG_DIST_TIME should be set to the closest value to **ROOT_CONTEND_FAST** in order to use the existing method as much as possible.

Modified Tree-ID State Machine



Example of Use of Proposed Method



Summary

- e Root contention is resolved in case
 - less than 8m transmission with IEEE 1394-1995
 - less than 28m transmission with P1394a draft 1.0

- e In order to resolve root contention with 50m or grater transmission , a supplemental root contention resolution method has been proposed.

- e The proposed method is compatible with current PHY.