

# Algorithm for Ordered Metric Adjustment

draft-zxd-rtgwg-ordered-metric-adjustment-00

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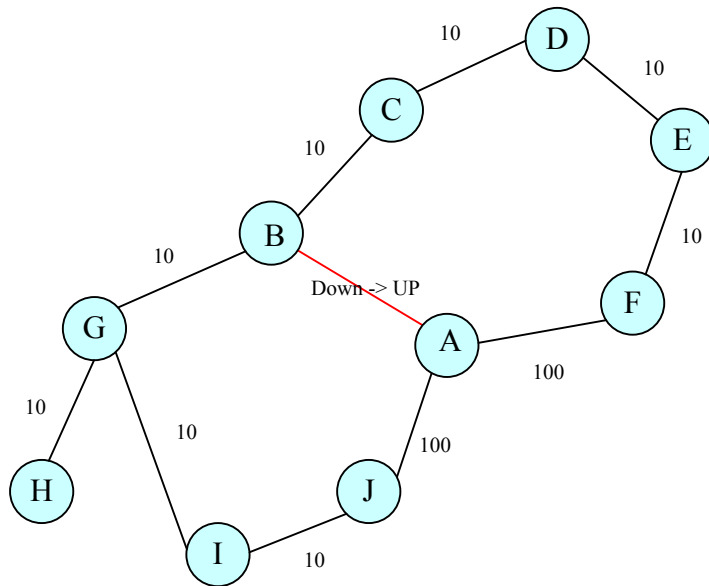
IETF 88, Vancouver, Canada

# Background Introduction

- The micro-loop route is an important topic in the IP domain.
- There are some RFCs/Drafts in RTG WG to discuss this issue:
  - ✓ RFC5715: A Framework for Loop-Free Convergence
  - ✓ RFC6976: Framework for Loop-Free Convergence Using the Ordered Forwarding Information Base (oFIB) Approach
  - ✓ draft-litkowski-rtgwg-uloop-delay-01: Microloop prevention by introducing a local convergence delay
- The concept of our draft is the same as section 6.1 of RFC5715,
  - ✓ A new algorithm .
  - ✓ Simpler than [OPT] referenced in RFC5715.

# The example(1) - 1

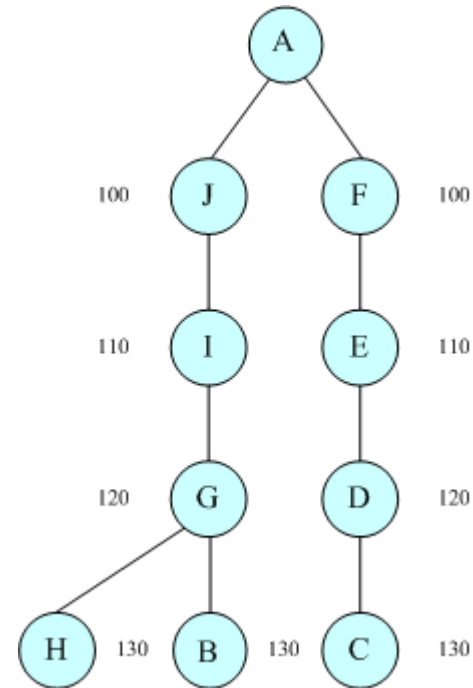
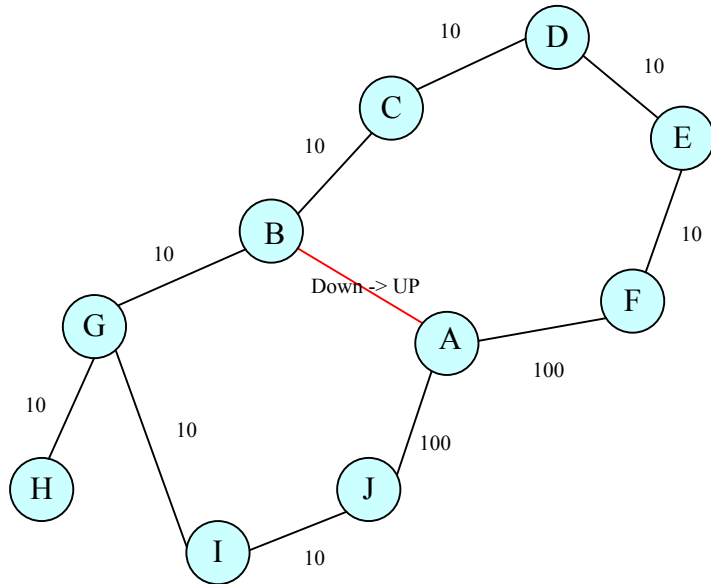
- The original topology:



- The scenario:
  - The link between B and A up.
  - The IGP adjacency is established.
- There is transient forwarding loop if
  - The FIB entry in device G is updated before B.

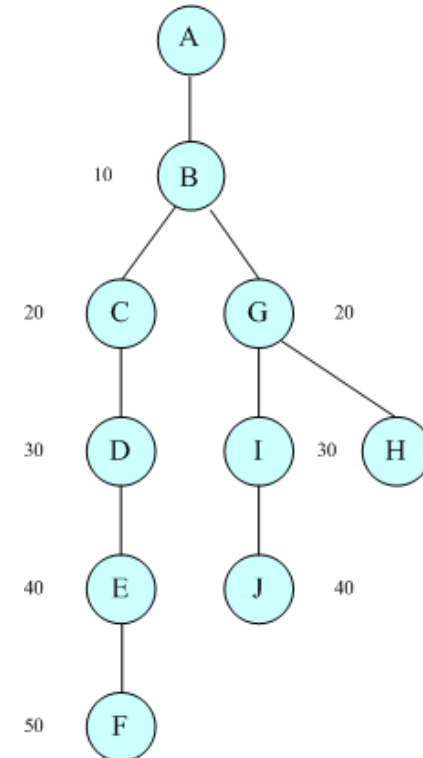
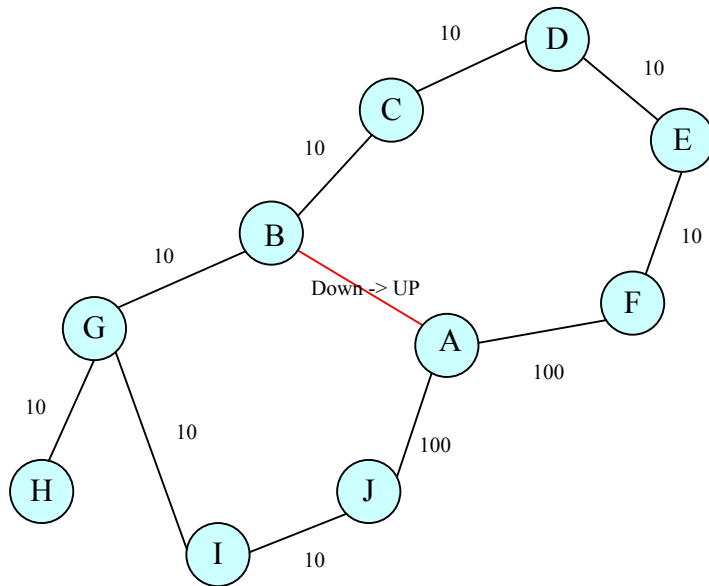
# The example(1) - 2

- Calculate the distances of other nodes to node A without the link “B→A”
  - Calculate the RSPF tree on node B
    - The “A” will be considered as the root;
    - The metric of “B→A” is maximum .



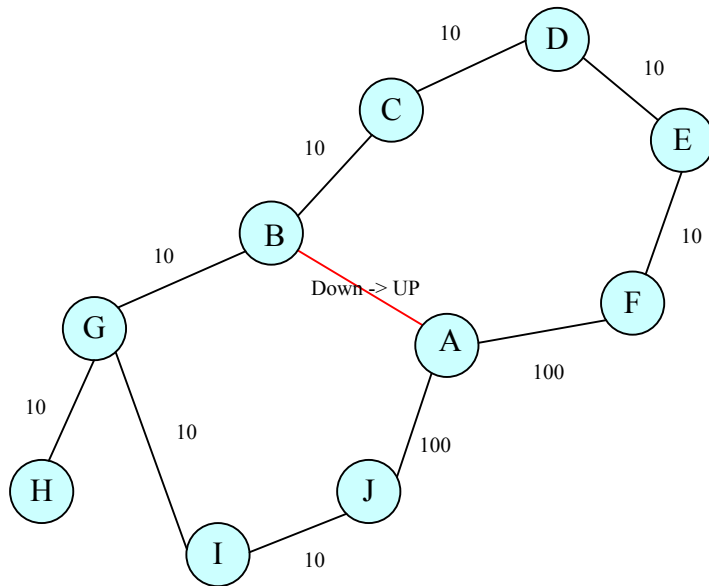
# The example(1) - 3

- Calculate the distances of other nodes to node A with the link “B→A”
- Calculate the RSPF tree on node B:
  - The “A” will be considered as the root:
  - The metric of “B→A” is the normal metric 10.



# The example(1) - 4

- Calculating the metric sequence to adjust the link "B→A" :

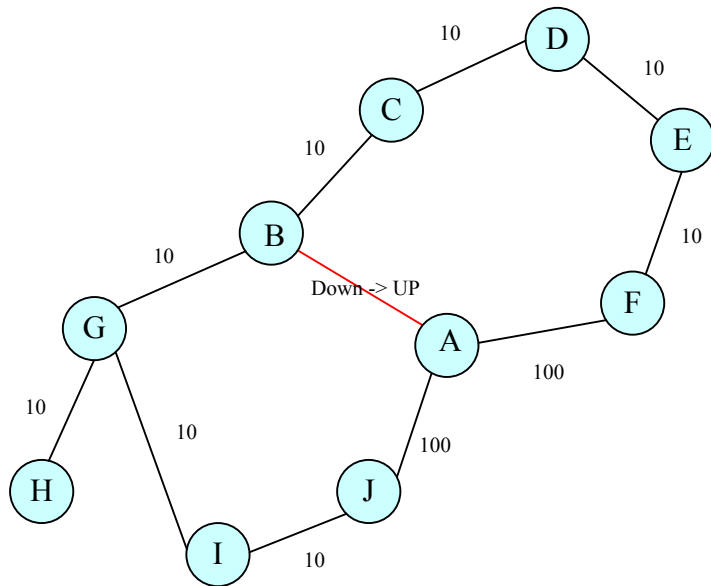


- Calculate the metric of node i in this set to the root A in these two RSPF tree: Cost(i, min) and Cost(i, max), we can get the following table

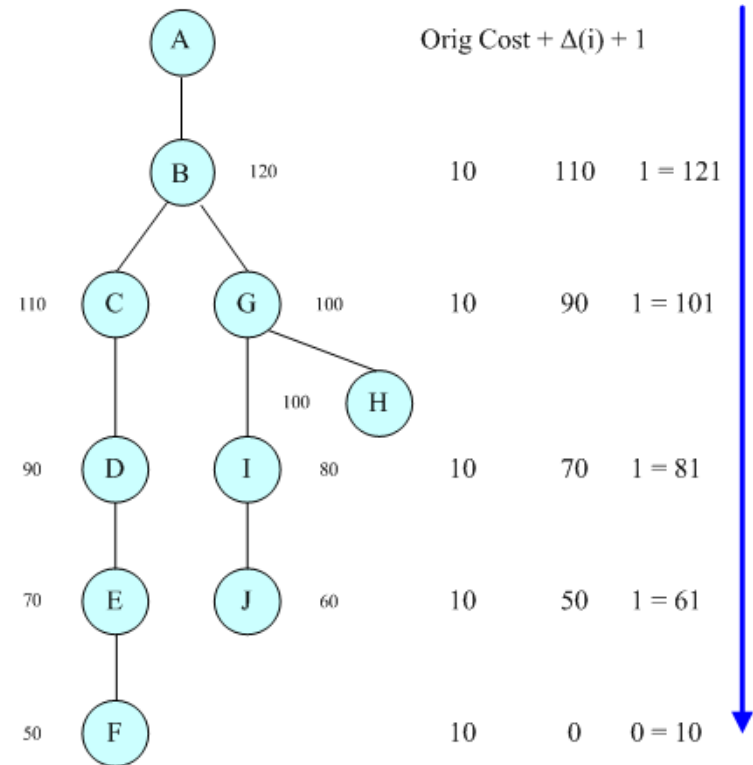
	Cost(i, max)	Cost(i, min)	$\Delta(i)$
B	130	10	120
C	130	20	110
D	120	30	90
E	110	40	70
F	100	50	50
G	120	20	100
H	130	30	100
I	110	30	80
J	100	40	60

# The example(1) - 5

- Calculating the metric sequence to adjust the link "B→A" :

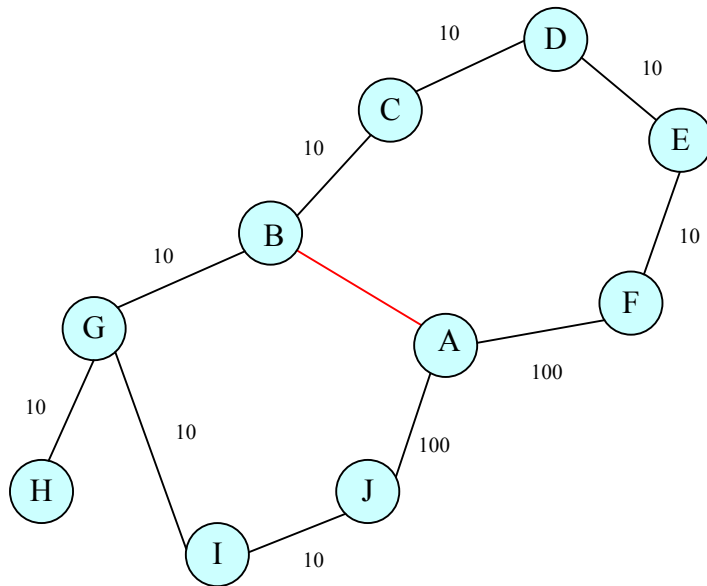


- The metric sequence of adjustment.



# The example(2)

- The original topology:



- The scenario:
  - The link between B and A down.
  - Adjacency is broken, the change of metric can be consider from original metric to maximum.
- The algorithm is same, but the order of metric adjustment is reversed.



# The difference with [OPT] in RFC5715

- The [OPT]
  - Tries to get a metric adjustment sequence(RMS) for each possible destination;
  - Optimizes this sequence to ORMS;
  - combines these ORMSs and prunes unnecessary metrics.
  - The challenge: Performance.
    - The number of RSPF: Base on possible node number;
    - ORMS algorithm.
- This draft:
  - Calculates a metric adjustment scope for each node.
    - a) this new metric will make the node i switch to the final best path.
    - b) this new metric doesn't make other unaffected nodes switch their paths.
  - Base on two times RSPF, calculates the best metric adjustment sequence in just one round.
  - **Performance:**
    - **RSPF: 2 times.**

# Next Steps

- We already get some comments about some papers of IEEE, we need more time to read it in detail.
- How to handle the multiple neighbors on broadcast link?
- How to improve the performance of network wide?