Distance Vector

**Bellman-Ford Eq.**

\[ d_x(y) = \min_v \{ c(x,v) + d_v(y) \} \]

- \( c(x,v) \) - cost from \( x \) to \( v \)
- \( d_v(y) \) - link costs to neighbors

\( c(A,B) = 2 \)
\( c(A,D) = 2 \)
\( c(A,E) = 4 \)
Node A

\[
\begin{array}{ccccc}
& A & B & C & D & E \\
A & 0 & 2 & \infty & 2 & 3 \\
B & 2 & 0 & 3 & & \\
C & 2 & 0 & 1 & & \\
D & 4 & 1 & 1 & 0 & \\
E & & & & & \\
\end{array}
\]

\[c(A, \cdot) = \{0, 2, \infty, 2, 3\}\]

\[
d_A(c) = \min_v \{c(A, v) + d_v(c)\}
\]

\[
d_A(c) = \min\left(2 + 3, \infty + \infty, 2 + \infty, 4 + 1\right)
\]

\[
d_A(c) = \min\left(0 + 4, 2 + \infty, \infty + 1, 2 + 1, 4 + 0\right)
\]

\[= 3\]
A

B

C

\begin{tabular}{l|c|c}
  to & dist & through \\
  \hline
  B & 41 & B \\
  C & 52 & B \\
\end{tabular}

\text{min}(50 - 10 \cdot 0 , 50, 1+1)
A sends to C

A B C
0 60 5

poisoned reverse

\[
d_c(A) = \min_v (C(c, v) + d_v(A))
= \begin{cases} 1 + 60, & 5c + 0, \\ 0 + 5 \end{cases}
\]
Hierarchical Routing
Intra-AS Routing

RIP - routing information protocol

- distance vector
- distance = # of hops
  → max 15.
- send every 30 sec.
- send forward table
- no message from neighbor in 180 sec. → link is broken

routed - app. level program.
UDP

access to forward tables in O.S.