Given: A cubic network has identical resistors, each with a resistance \( r \). A current \( I \) enters the network at \( A \) and leaves at \( G \).

Find the network resistance \( r_{total} \) in terms an individual resistor \( r \).

\[
\begin{align*}
A) \quad r_{total} &= \frac{2r}{3} \\
B) \quad r_{total} &= r \\
C) \quad r_{total} &= 2r \\
D) \quad r_{total} &= \frac{4r}{3} \\
E) \quad r_{total} &= \frac{5r}{6}
\end{align*}
\]

By symmetry, at \( A \), \( I \) is equally divided into 3 equal branches and the potential at the junctions \( B, E, \) and \( D \) are the same, the these points can be joined together without changing the network resistance \( r_{total} \). The same is true at the junctions \( F, C, \) and \( H \). The redrawn network is shown below.

Answer E. \( r_{total} = \frac{1r}{3} + \frac{1r}{6} + \frac{1r}{3} = \frac{5r}{6} \).

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