A straight long wire of resistance $R$, radius $a$ and length $L$. It carries a constant current $I$.

Determine the direction of the Poynting vector $\vec{S}$ at $X$.

A) The direction of $\vec{S}$ is $\leftarrow$.

B) The direction of $\vec{S}$ is $\uparrow$.

C) The direction of $\vec{S}$ is $\rightarrow$.

D) The direction of $\vec{S}$ is $\downarrow$. 
\( \vec{E} \) is along the direction of \( I \). At \( X \), using the right-hand-rule, one finds that \( \vec{B} \) is pointing out of the paper. Thus \( \vec{S} = \frac{1}{\mu_0} \vec{E} \times \vec{B} \), and it is pointing downward, or pointing radially inward.

Answer **D**.

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