You're using the Z-turn board with the Zynq-7000 SoC (XC7Z020-1CLG400), which indeed supports Gigabit Ethernet (1000 Mbps) via the PS (Processing System) Ethernet controller. However, if you're only getting 100 Mbps, it's typically due to hardware configuration, PHY settings, or software driver issues.

Here’s a checklist and possible solutions to achieve 1000 Mbps:

✅ 1. Confirm the Ethernet PHY Supports 1 Gbps
The Z-turn board typically uses the TI DP83867, Realtek RTL8211E, or Micrel KSZ9031 PHY (depends on the exact model).

All of these can support 1 Gbps. Confirm from the board schematic or datasheet which PHY is used.

✅ 2. Check the Ethernet Cable and Switch
Ensure you're using a CAT5e or CAT6 cable.

Verify that the switch or router you're connecting to supports Gigabit Ethernet on that port.

Some managed switches allow you to force or limit port speed, so check the settings.

✅ 3. Check Auto-Negotiation / PHY Settings

If the PHY and switch are compatible but you're stuck at 100 Mbps, auto-negotiation might be failing. Try:

- Using Linux command:

```bash
ethtool eth0
```

You should see:

```vbnet
Speed: 1000Mb/s
Duplex: Full
Auto-negotiation: on
```

- If it shows only 100 Mbps, try forcing the speed:

```bash
sudo ethtool -s eth0 speed 1000 duplex full autoneg on
```

If that fails:

- Check for boot-time PHY configuration issues.
- Look into **device tree** or **U-Boot** settings.

✅ 4. Device Tree (DT) Configuration

Improper DT configuration can result in incorrect PHY operation:

- Make sure the Ethernet node in your device tree (`*.dts`) matches the PHY interface type (**RGMII**, **SGMII**, or **GMII**).
- For 1000 Mbps on most Zynq designs, the correct PHY mode is typically:

```dts
phy-mode = "rgmii-id"; // or "rgmii", depending on the board
```

If the mode is incorrectly set to `"rmii"` or `"mii"`, you'll be limited to 100 Mbps.

✅ 5. Check U-Boot Configuration (if applicable)

In U-Boot, you can also use:

bash Copy Edit

```
mdio list
mdio read
```

To verify PHY ID and link status.

Also make sure the PHY is initialized correctly at boot — sometimes U-Boot initializes it at 100 Mbps unless configured otherwise.

✅ 6. Check Kernel Driver and Version
Are you using a custom kernel or PetaLinux?

Ensure you're using the correct Zynq GEM Ethernet driver.

Older kernels or incorrect device tree bindings may not properly support gigabit operation.

✅ 7. Test in U-Boot or Baremetal (Optional)
You can build a minimal test using Xilinx SDK / Vitis, and check the Ethernet link status in baremetal to rule out Linux driver issues.

Summary of Actions

Area	What to Do
Cable/Switch	Use CAT5e/6 cable; ensure switch port is gigabit
PHY Compatibility	Check board datasheet; confirm it supports 1 Gbps
ethtool Output	Verify and try to force 1000 Mbps
Device Tree	Ensure phy-mode is correct
U-Boot Config	Check PHY initialization
Linux Kernel	Use updated driver and kernel for Zynq