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| **Cell Membrane** | **Package Filter Firewall** |
| Phospholipid bilayer | Firewall |
| Carrier protein | Security access strategy |
| Glycoprotein |
| Nutrient | Packet |
| Fluidity |  |
| Permselectivity | Filter protocols |
| closure property |
| Asymmetry |  |

The firewall is a network security system that monitors and controls the incoming and outgoing network traffic based on predetermined security rules. Just like the cell membrane, forms the permeability barrier that separates the cytoplasm from the exterior environment. Cells’ membranes have three characteristics: Fluidity, Asymmetry and Permselectivity. The firewall is very similar to the cell membranes, it also has permselectivity. The cell membranes use carrier protein to transport water-soluble lower molecular from the outside to the inside, and use glycoprotein to receive chemical signals. In contrast, the firewall use security access strategy to filter packets.

After comparison, I think maybe we can promote the package filter firewall in such aspects: first, we can improve the packets matching algorithm. The Internet security demands is becoming larger and security protocols is becoming more and more. Thus changing a matching algorithm to accelerate the system is necessary. Traditional matching algorithm is linear matching. We can seek a suitable classification algorithm to replace the old one. Under cellular mechanism, the cell will use passive transport and endocytosis to deal with interchange materials in large quantities, which is an efficient mechanism. Thus we can simulate the cell membrane to improve our security access strategy. For example, it is really time-consuming to check packets from a same IP address every time. Once the packet from an IP address pass the filter protocols, we can add state to the list, the next a same IP send require packet to us, we can approved it quickly by checking the state list first. Third, the traditional package filter firewall works in network layer, which means that it is hard to check the data burst where the malicious code could hide in. Under cellular mechanism, cell could recognize the materials pass through the cell membrane since certain carrier protein only transport a kind of materials. Thus maybe we can explore the traditional firewall, adding application layer packet filtering technology.

The flaws of package filter firewall:

1. IP spoofing
2. Implicite channel attack
3. No state inspection
4. The speed of filtering
5. Filter protocols are complex and hard to design

The promotion

1. Improving matching algorithm
2. Stateful packets filtering
3. Add application layer packet filtering technology